A phonological investigation into the Meroitic 'syllable' signs – *ne* and *se* and their implications on the *e* sign*

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One of the most striking things about the Meroitic script is the inclusion of a distinct set of, traditionally termed, 'syllable' signs (1a).[1] These 'syllable' signs seem to show a disparity in the uniform structure of the script where (following Hintze 1973a) every consonant sign includes an inherent unmarked 'a' vowel (1b); where there is a change in the vowel quality, a separate vowel sign is positioned following the consonant sign (1c). Since Hintze's (1973a) revision, the signs have the following traditional transliteration (italics) and phonemic transcription (slash brackets):

(1a) 'syllable' signs (1b) inherent 'a' vowel sign (1c) vowel change

    ʋ// - *se* /-s/ ~ /se/   Ʒ - *s* /sa/   ↯Ʒ - *si* /si/

    ʎ - *ne* /-n/ ~ /ne/   ʀ - *n* /na/   ↯ʀ - *ni* /ni/

    /↚ - *te* /-t/ ~ /te/   ϟ - *t* /ta/   ↯ϟ - *ti* /ti/

    ↳ - *to* /tu/[2]

The representation of the 'syllable' signs does not follow the uniformity of the other consonant signs in that they do not include the unmarked 'a' vowel but a mid vowel *e* - /e/ (or zero-vowel) for three of them and the back vowel *o* - /u/ for one. What also differentiates the 'syllable' signs from the inherent 'a' signs is that no separate vowel signs are found in the texts to follow the 'syllable' signs, so no vowel quality change can be made on their intrinsic vowel (1d):

(1d) * ↯ʋ// - *sei*, * ↯ʎ   - *nei*, * ↯/↚ - *tei*

Hintze (1973a) also put forward that the three 'syllable' signs that contain the *e* - /e/ vowel have a dual representation where this vowel can also be unrealised (zero-vowel), hence the ambiguous transcription in (1a). The disparateness of the 'syllable' signs has not gone unnoticed by script typologists such as Saloman (2000:95):

> A further peculiarity of the essentially simple Meroitic system is the presence of four truly syllabic, that is, indivisible signs for CV syllables. These present a problem for both the historical and typological analysis of the script. For although graphic archetypes for these syllabic characters can be identified in the demotic Egyptian script which is the source of the Meroitic characters generally, it is not clear why these and only these four syllables received special treatment.

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[1] The Meroitic script has two forms that are both derived from the Ancient Egyptian writing system; a hieroglyphic form, used monumentally, and a cursive (handwritten) form mainly used on stelae and ostraca. Throughout this paper, I use the cursive form for consistency, although §4.6.2 investigates the hieroglyphic forms of the 'syllable' signs. The Meroitic script is also to be read from right to left.
[2] The in-depth analysis of the other 'syllable' signs *te* and *to* is beyond the scope of this paper see Rowan (forthc.).

The Meroitic scholar Millet (1996:85) also stated that:

> For reasons not understood, but possibly having to do with the existence of dialect differences, the devisers of the system created four further characters to express the syllables 人 *ne*, ⊔/// *se*, /ϟ *te*, and ⌣ *to*.

In what follows, a line of argument will be put forward which, I believe, deserves serious consideration: the reanalysis of the 'syllable' signs 人 - *ne* and ⊔/// - *se* and the vocalic ϟ - *e* sign. This reanalysis is investigated here primarily through a phonological analysis that follows from an initial proposal made in Rowan (2004). According to which I proposed that the signs 人- *ne* and ⊔/// - *se* do not include a vowel at all and that from their ambiguous transcription the interpretation of them as plain consonants is the correct one. This proposal has further repercussions on the analysis of the vowel sign ϟ - *e*. This vowel sign has also traditionally been thought of as having a dual usage where it can represent a mid-vowel and indicate the absence of a vowel (/e/ ~ /ə/ or zero-vowel).

As the argument, propounded by Hintze (1973a), for the vowel sign ϟ - *e* being a zero-vowel indicator was built upon the analysis of the 'syllable' signs 人 - *ne* and ⊔/// - *se*, it follows that I put forward evidence here to argue that the ϟ - *e* vowel sign is used epenthetically, as Millet (1973:53) claimed, in forms that transcribe borrowed words when consonant clusters are encountered. This means that the vowel sign ϟ - *e* was not devised to have the dual usage of indicating a vowel and a zero-vowel.

In this paper, I draw upon and discuss other analyses of the representations of these signs particularly those by the Meroiticists Griffith (1911, 1916), Hintze (1973a) and Rilly (2005). Central to the claims this paper makes is the fact that there are distinct levels; the orthographic, phonological and phonetic, that have to be understood in any analysis of the Meroitic script.

1 Griffith's analysis of the 'syllable' signs

Griffith (1911), as the decipherer of the Meroitic script, conducted the first study into the phonemic assignment of the Meroitic signs. In this study, Griffith concludes that the 'syllable' signs (1a) 'are syllables possessing inherent vowels' (1911: 7). He came to this conclusion during his research into the Meroitic script as he noted that the 'syllable' signs could never precede the signs for the vowels but were able to follow them. This section presents Griffith's evidence for the consonantal phonemic representations of the 'syllable' signs and the evidence he gives for their vocalic quality.

Griffith (1911:8-9) gives a list of Egyptian titles in Meroitic spelling '…a list of the principle equations by which the phonetic *(sic)* values of the Meroitic alphabet can be fixed.' I will summarise Griffith's evidence for the phonemic attributes of these 'syllable' signs individually below.

1.1 ⋏ *ne*

Griffith originally transliterated this sign as *ñ*, as he thought it was used to represent the sound [ŋ] where he wrote it as '*ny*'. Griffith's principle equation in deducing the phonemic attribute of this sign was through the comparison with the Egyptian demotic:

⋏ϛⵡ∕∕Ʒ *Inscr., Kar.,* Ethiopian (?) title rendered *qrny* in Eg. dem.   [Transcribed *qêreñ*.]   (1911: 9)

In this first study (1911) into the phonemic assignment of the 'syllable' signs, Griffith observed that the sign ⋏ is never followed by a vowel sign and that it varies with the sign Ʒ - *n* (which contains the inherent 'a' vowel therefore representing /na/). He goes on to further state that, 'Probably, therefore, ⋏ represents that particular Nubian *n* which most closely resembles *ni* and may be represented by *ñ*' (1911:14).

Griffith (1916:117), in a second study, revised this sign's value to /ne/ as he observed that Ʒ - /na/ may be followed by the separate vowel signs ⵞ - *i* and ∕ - *o* but not by ϛ - *e*. As these two nasal signs (Ʒ and ⋏) commonly vary with each other and ⋏ is never followed by a vowel sign, Griffith believed therefore that ⋏ must contain the vowel *e*. Griffith kept to his original transliteration of this sign as *ñ* even though he revised its phonemic equivalence to /ne/.

1.2 ⴑ∕∕ *se*

The original transliteration of this sign was given as *š* or *s* by Griffith to denote the phoneme /ʃ/ or /s/.[3] He attributed the /s/ equivalence through the following equation where the Greek form shows a word-final /s/:

ⴑ∕∕ ⵡƷϛ *Inscr., Kar.* = Παχωρας, …[Transcribed *Paḫaras*.]   (1911: 9)

The /ʃ/ equivalence was made through this equation with Egyptian demotic:

ⵞϛ ⴑ∕∕ ⵞ♂∕⵲ …Eg. dem. *T wšte*, …[Transcribed *tewisti*.]   (1911: 9)

Griffith saw that the ⴑ∕∕ sign 'occurs as initial but is never followed by a vowel sign, and therefore may have contained an inherent vowel' (1911:15).

Again, Griffith (1916:117) revised this sign's attribute when he observed that this sign varied with Ʒ - *š*. Since Ʒ is commonly followed by the separate vowel signs for ⵞ - *i* and ∕ - *o* and very rarely by ϛ - *e*, Griffith therefore concluded that ⴑ∕∕, which shares the same consonant /s/, must contain the *e* vowel. He also believed that Meroitic made no distinction between *s* and *š* (at least in writing). Here also Griffith

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[3] Griffith saw that there was a double representation of the phonemic equivalence with this 'syllable' sign and the sign Ʒ (containing the inherent vowel 'a') that he also thought represented /ʃ/ transcribed as *š*. 'The Meroitic letter Ʒ transcribed *š* often corresponds to *s* and seems to be nothing more than *s*, while ⴑ∕∕ is *se*, as it were ϛƷ' (Griffith 1929:69). The assignment of this sign Ʒ would be revised by Hintze (1973a) where those who follow Hintze now transliterate it as *s*.

kept to his original transliteration as *s* even though he now believed the sign phonemically represented /se/.

2 Hintze's revised system

Griffith (1916:122), and other Meroitic scholars,[4] kept to the original transliteration of the signs (*ñ* and *s*) up until Hintze's revision in the 1970s; 'Until more certainty is arrived at it seems best to keep to the transcriptions both of vowel-signs and of ⲗⲟ, ⲁ, which have been used in all the memoirs from *Meroe* onwards, although they must be looked upon as conventional to some extent.' Hintze (in a paper written for the Khartoum conference 1970 and published 1973a) proposed a new method of transliteration that was thought to be more representative of their actual phonemic values. The majority of scholars working on the Meroitic language adopted Hintze's revised method of transliteration.[5]

Hintze (1973a:321) revised the transliteration propounded by Griffith and proposed that the 'syllable' signs transliterated since Griffith's time as *s* and *ñ* are to be transliterated now as *se* and *ne*. Hintze outlined that the revised transliterations were not motivated by new discoveries in the field of Meroitic phonology but from a 'resumption of remarks and alterations already made by Griffith in 1916' (1973a:328). The remarks Hintze is referring to are Griffith's observation that no vowel signs follow these two 'syllable' signs ⲁ and ⲗⲟ whereas an analysis of their 'consonantal' equivalents[6] ⲣ and ⲍ indicates that only the separate vowel signs ⲩ - *i* and ⲟ - *o* are found following these signs but never the ⳇ - *e* sign.[7]

Although this is a logical analysis, this paper will show that it is not the case that these 'syllable' signs ⲁ and ⲗⲟ contain a vowel. Before this evidence can be put forward, another aspect of the Meroitic script needs to be discussed – the separate vowel sign ⳇ - *e*. It will be seen that the analyses of the 'syllable' signs and this vowel sign ⳇ - *e* are interconnected.

3 The ⳇ - *e* vowel sign

As Griffith (1911) deciphered the phonemic equivalents of the Meroitic signs, he was the first scholar to give an analysis of the sign ⳇ. He proposed that this sign represented a vowel (1911: 7) and that 'ⳇ is more usually a weak vowel…it is the vowel of the Egyptian definite article, which in Coptic is vowelless, and…it terminates the name of Philae, which in Coptic has no terminal vowel…It is very commonly omitted in variants of words.' (1911:12). Griffith therefore assigned this sign's value as /e/ transliterated as *e*.

In 1916, Griffith published a paper on the progress of his decipherment; in this paper, he revised his analysis of this sign and stated that 'it seems then that ⳇ is [also] added to a consonant to mark the absence of vocalisation' (1916:120). The evidence

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[4] Cf. Zhhlarz (1930); Vycichl (1958:75; 1973:61); Hintze (1987).

[5] The Meroitic scholar Abdallah (2003:24) keeps to Griffith's transliteration: 'I prefer to continue using *ñ* because of the ya-sound it suggests despite the nuisance of the symbol.' He also keeps to the same representation of Griffith's *s* and *š;* it is, however, unclear what he considers the phonemic representation of these signs to be.

[6] ⲍ now transliterated as *s* /sa/ and ⲣ *n* /na/.

[7] It is believed that in the rare cases where separate vowel signs follow these 'syllable' signs it is due to orthographic error.

Griffith gave for this conclusion came through his analysis of cognate words in Coptic. A summary of his data for this proposal is given here (1916:119-120):

(2a)   Coptic   t-beke (?)   (2b) Egyptian t-washte
         Meroitic t ϟ b ⅄ k ⅄   Meroitic t ϟ w ⅄ s ϟ (?)t ⅄

In the forms of (2) Griffith states that the feminine article *t-*, which 'in Coptic has only the faintest vocalisation is rendered by t ϟ [in Meroitic]' (1916:119).[8] Griffith also gives a Coptic word *shapshi ~ shepshe* where the Meroitic equivalent form shows the vowel sign ϟ - *e* inserted between the internal consonant cluster 'psh' /pʃ/: š ⅄ p ϟ š ⅄ (y ϟ) (*sipesi(ye)*).

Further data from Griffith (1916:119-120) gives the Meroitic equivalents positioning this vowel sign ϟ - *e* at the end of words where the Coptic equivalents show no word-final vocalisation:

(3a)   Coptic   Pakhôm   (3b)   Coptic   (P-)Bêk
         Meroitic   Ph̲ ⁄ m ϟ   Meroitic   B ϟ k ϟ
         Translit.   *phome*   Translit.   *beke*

Griffith's analysis of the sign ϟ - *e* initiated a long-held assumption that it represented not only the vowel /e/ but also the absence of a vowel (zero-vowel) and thus had a dual usage.

3.1   The analysis of ϟ - *e* post-Griffith

The investigation into the phonemic equivalence of the vowel sign ϟ - *e* was taken up by Millet in his paper for the Khartoum conference (1970) (proceedings published in 1974). Millet presumed that the utilisation of the ϟ - *e* sign was specifically to break up consonant clusters in Egyptian names, which the Meroites' script and language could not handle. Millet believed that the vowel sign ϟ - *e* was inserted because it was 'the symbol for the weakest of their vowels […] since its omission would have involved the tacit expression of a stronger vowel' (1974:53).[9]

In his paper written for the Khartoum conference (1970) (proceedings published 1973), Hintze also presented his investigation into the ϟ - *e* sign's assignment. He agreed with Griffith's proposal that it indicated the vowel /e/ or the absence of a vowel; 'Consonant + e has a double value: /Ce/ or /C/ (consonant without a vowel); cf. *ph̲ome* - /pah̲om/, *tewiseti* - /twisti/, *medewe* - /medwe/' (1973a: 323).
Hintze concurred with Griffith's proposal through studying the same examples from Griffith's research (1916). Hintze also stated that Millet's assertion of the use of this vowel sign as a zero-vowel indicator being restricted to the transcription of Egyptian

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[8] Griffith's transcription of [t ϟ] is misleading as this indicates the inherent 'a' sign with a following separate vowel sign and not the actual sign used which is the 'syllable' sign /⅄ - *te*. See also §4.1.

[9] This remark refers to the script being inherently syllabic. In the accepted system (expounded by Hinze 1973a), each consonant grapheme written without a vowel grapheme following is interpreted with the low vowel 'a'. However, Millet's 'stronger vowel' covers not only 'a' but also 'i' and 'o' as he did not adopt Hintze's system.

names was wrong as it 'was part of the system of Meroitic writing' (1973a:330). Hintze's justification for this came from his discussion on the interpretation of the 'syllable signs' in Meroitic. Millet (1974), is putting forward the claim that the ϛ - *e* vowel sign was utilised as an epenthetic vowel only when a consonant cluster was encountered in Egyptian names that the Meroitic language could not cope with, which would be due to the variance between the two languages' syllabic structures. Hintze (1973a) refutes Millet's proposal by making the claim that the ϛ - *e* sign indicated the absence of a vowel and was actually part of the Meroitic system for their own language, and not just restricted to the transcription of Egyptian names.

Hintze published another paper (1973b) where there is a different phonemic attribution of this sign (ϛ) from that given in (1973a). In the 1973a paper he gives the phonemic equivalences as /e/ or zero-vowel, whereas 1973b:322 states that the vowel sign denotes a schwa vowel /ə/ and zero-vowel.[10] The vowel sign ϛ in Meroitic has long been transliterated as *e*, and Hintze's (1973b) proposal that it represents /ə/ and zero-vowel, was accepted in the field of Meroitic research as of Priese (1973) and Hofmann (1981).[11] Hintze firmly stated that 'if a consonant lacks a vowel altogether, this lack is represented by [ϛ] *e*; the sign *e* [ϛ] therefore has a dual usage' (1978:94).

Rilly (1999b), in his analysis of the occurrence of this vowel sign in a study drawing upon a sample of Meroitic texts, agrees with Hintze's proposal that this vowel sign ϛ - *e* denotes the vowel /ə/ or a zero-vowel when he states that '*l'absence de voyelle entre deux consonnes est notée par un signe translittéré e. Il s'agit à l'origine d'un schwa, transcrivant une voyelle centrale atone [ə], qui n'est prononcée que dans la mesure où elle peut faciliter l'articulation.*' (1999b:104).[12] By analysing the equivalences of Meroitic words (that contain *e*) that are transcribed in Greek, Rilly (2005:398) revises the phonemic representation of this sign and proposes that ϛ - *e* is not just used to transcribe a schwa but in fact represents two phonemes: /e/ and /ə/, where the schwa can then be realised in two ways: as a schwa or the absence of a vowel.

Griffith (1916) initiated the assumption that ϛ - *e* represented a zero-vowel by analysing Coptic equivalents of Meroitic forms (see fig. 2 & 3), as ϛ - *e* was written word-finally in Meroitic where the Coptic forms show no word-final vocalisation. He, however, included no discussion in his analysis of the syllabic differences between the two languages,[13] in that Meroitic prohibits words ending in consonants such as /m/ and /k/[14] (unlike Coptic) and so inserts a word-final epenthetic vowel. The vowel sign ϛ - *e* is then used epenthetically (discussed in §5).

Hintze's main argument that the Meroitic ϛ - *e* sign represented a zero-vowel came from his analysis of the 'syllable' signs (1973a:330):[15]

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[10] The scholar Zawadowski, working independently from Hintze, also arrived at the conclusion that the grapheme ϛ represented the schwa vowel (1972:22).

[11] Priese (1973:298): 'e̱ /ə/, /Vokallosigkeit/.'; Hofmann (1981:31): 'Wie bereits vermerkt, bezeichnet e̱ entweder /ə/ oder Vokallosigkeit.'

[12] Cf. Rilly (2005).

[13] Griffith's only proposal on the syllable structure is: 'the writing indicates that the words consist mainly of open syllables commencing with a consonant' (1911:22).

[14] It will be evidenced in §4 that the Meroitic language can have word-final consonants but these are drawn from a distinct set /s, n, t/, to which non-coronal consonants such as /m/ and /k/ do not belong.

[15] Cf. Millet (1973) for an alternative proposal.

>That the "custom" to write *e* for the zero-vowel was not restricted to the transcription of consonant clusters in foreign names and words, but was part of the system of Meroitic writing, will become evident, if the interpretation of "*s*" = *se* and "*š*" = *s* […] is accepted. We know, that the combination of [s] and [l] results in [t]. Whichever the phonetic explanation may be, such a phenomenon is only possible if [s] and [l] are in immediate contact, without an intervening vowel. Therefore we have /se/ + *l* > *t* (in traditional transliteration *s* + *l* > *t*), but /sa/ + *l* (in traditional transliteration *s* + *l*) remains unchanged.
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>A second corresponding example is the well-known disappearance of final -*ñ* in cases like *hrpheñ* : *hrphe-l, yetmetñ-mete-l : yetmet-lh-l* etc. which Millet has very convincingly explained as resulting from assimilation of final -*ñ* to the initial *l-* of the following word or to the "article" -*l.* As far as I can see, such an assimilation does not occur with final -*n*. This can now easily be explained if final -*ñ* is /ne/ and also /-n/, whereas final -*n* is /-na/. The final /-n/ (= *ñ*) is in immediate contact with the following /l-/ and the result is /-ll/ which is written -*l;* but this assimilation is prohibited by the final vowel /-a/ in words ending in -*n* (= /-na/).

To clarify Hintze's proposal, when the 'syllable' signs that Hintze believed should now be transcribed as *se* (𐦪) and *ne* (𐦐) immediately precede the liquid - *l* (𐦳) /l/ they assimilate, thereby 'proving' that the 𐦡 - *e* sign represents a zero-vowel, whereas their 'consonantal' equivalents 𐦩 - *s* /sa/ and 𐦢 - *n* /na/ (vocalised with the inherent 'a' vowel) show no assimilatory process. Hintze is here extrapolating that, as he believes the 'e' sound is inherent in the 'syllable' signs, the analysis of which must therefore extend to the vowel sign 𐦡 - *e*, thereby 𐦡 - *e* is also a zero-vowel indicator.

The previous analyses of these signs' phonemic representations, although based upon logical argumentation, have resulted in an ambiguity in the Meroitic script: the problems of when the sign 𐦡 - *e* is to be vocalised and when it is not; and why the syllabic principles that underlie the script, where every 'consonant' sign has an unmarked 'a' vowel, includes four distinct 'syllable' signs that show an inherently differing vowel (where this inherent vowel can also denote a zero-vowel in three of the 'syllable' signs). This has long been puzzling especially from a typological viewpoint, as it seems to be at odds with the uniform organisation of the Meroitic script.[16]

4 𐦪 - *se* and 𐦐 - *ne*

In the following sections, I put forward a body of evidence that shows that these 'syllable' signs are in fact closed-syllable indicators and as such are phonemically /s/ and /n/ with no inherent vowel.[17] Rilly (2005:378)[18] outlines the distinction between the two signs 𐦩 - *s* and 𐦪 - *se* as being due to the Meroitic graphical system and not

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[16] The Old Persian cuneiform script has long been noted as the closest script (typologically) to Meroitic in its organisation *if* it is followed that the Meroitic 'syllable' signs do contain the /e/ vowel. See David Testen (1996) "Old Persian Cuneiform" for more on the structure of the Old Persian writing system.

[17] The analysis of *te* and *to* are outwith the scope of this paper as they need further discussion. However, I put forward that the same proposal, that there is no vowel contained within the sign, holds for *te* and *to* also, see Rowan (forthc.).

[18] Contra, Zawadowski (1972).

that they are of an unspecified phonological opposition.[19] I agree here that it is not that the signs ꒒ - *s* and ꒒꒒ - *se* vary as to their consonantal features but I claim in this paper that they differ as to the nucleus (vowel) that follows them where ꒒ - *s* /sa/ = CV and ꒒꒒ - *se* /s/ = C. This same analysis is applied to ꒒ - *n* /na/ = CV and ꒒ - *ne* /n/ = C.[20]

I draw upon a representative sample of data taken from the corpora of Meroitic texts, which show the positioning of these signs. The placement of the 'syllable' signs, in the majority of cases, is word-final, as shown in (3) and (4). The positioning of these signs at word-edges is primarily indicative of them not containing an inherent vowel:

(3)   Occurrences of ꒒ - *ne*   (4)   Occurrences of ꒒꒒ - *se*

tḫne-yi	(REM 0094)	*mdese*	(REM 0094)
qrne-yi	(REM 0094)	*wse*	(REM 0094)
sobne-yi	(REM 0094)	*mrse*	(REM 1183)
tḫne-yi	(REM 0094)	*bsḫrkese*	(REM 1182)
hrpḫene-yi	(REM 0094)	*arese-li*	(REM 1003)
tdomne	(REM 0094)	*mlomkse*	(REM 1208)
pḫine-l	(REM 0094)	*abrse-lw*	(REM 1003)
wene	(REM 0094)	*sorese*	(REM 1044)
plne	(REM 0094)	*deqebese-wi*	(REM 1003)
kene	(REM 0101)	*qese-wi*	(REM 0074)
ḫbḫne	(REM 0097)	*kisrise*	(REM 1182)
qorene	(REM 0502,etc.)	*arese-li*	(REM 1003)
wetney-qeli	(REM 0544)	*ktwse*	(REM 1063)
hrpḫne	(REM 1088)	*qorpse*	(REM 0088)
ksbne	(REM 0111)	*kese*	(REM 1063)
aḫne-witw	(REM 0407)	*bsitkbḫese*	(REM 1183)
qbne-li	(REM 0089)	*nbrlise*	(REM 1182)
ḫbḫlne	(REM 0125)	*klmese*	(REM 1183)
trene	(REM 0086)	*mlomkse*	(REM 1208)
mneke-li	(REM 0521)	*aḫdose*	(REM 0833)
tinneke	(REM 1003)	*armeyose-li*	(REM 1003)
tqne-l	(REM 1044)	*deqebese-wi*	(REM 1003)
edḫne	(REM 1044)	*prtedse*	(REM 1003)

4.1   Statistical analysis of the positioning of the 'syllable' signs

The following tables (fig. 5 & 6) summarise a statistical analysis of the occurrences of the two 'syllable' signs ꒒꒒ - *se* and ꒒ - *ne*.[21] I claim that the occurrences of these

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[19] Rilly means by this that both signs represent the phoneme /s/ and the 'syllable' sign ꒒꒒ - *se* is always written preceding consonantal signs and the inherent 'a' sign ꒒ - *s* is always written preceding vowel signs.

[20] C=consonant and V=vowel.

[21] Cf. Rilly (2005) for a discussion on the 'syllable' signs as grammatical suffixes i.e. *ne* as a nominal derivational suffix, *se* a genitive postposition and *te* as a verbal suffix.

'syllable' signs indicate that they do not contain an inherent vowel. The data is drawn from a sample of Archaic to Late period Meroitic texts.[22]

(5)   Occurrences of ⅄ - *ne*[23]

-ne#	47	*-neb_*	2
*-ne-yi_*	20	*-nene_*	2
*-ne-l_*	13	*-nes_*	2
*-net_*	11	*-ne-qo_*	1
*-net_*[24]	11	*-ner_*	1
*-nek_*	7	*-neẖ_*	0
*-new_*	4	*-neḫ_*	0
*-ney_*	3	*-nem_*	0
*-neq_*	3	*-ned_*	0
*-neye_*	2	*-nep_*	0

We can see from Table (5) that in the majority of instances ⅄ - *ne* is found word-finally.[25] In the second highest occurrence, we find the particle *-yi* following the 'syllable' sign.[26] This is an honorific particle *-i,* that Griffith (1916:123) saw becomes *-yi,* with an epenthetic glide to avoid the adjacency of two vowels. The instances of ⅄ - *ne* + *-yi* could be evidence to say that there is a vowel contained in the ⅄ - *ne* sign, although a strong case against this is that as no separate vowel signs follow the 'syllable' signs the epenthetic glide is used to stop the 'syllable' sign being followed by *-i*. As we know *-i* is a suffix particle, we can discern therefore that in these cases ⅄ - *ne* is morpheme-final also.[27] Moving to the third highest scoring is ⅄ - *ne* followed by *-l*. All the forms beginning with *-l-* are when the determiner *-l,* the adjective *lḫ,* and the articles *li, lo* and *lowi* follow the ⅄ - *ne* sign. This shows the ⅄ - *ne* sign occurring morpheme-finally in these data also.

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[23] The occurrences of the nasal followed by *k* and *t* (where *t* is not the result of coalescence of *s*) indicates a word boundary between the signs. See §4.4 for the reasons as to this due to an orthographic convention.
[24] These instances of *ne* + *t* are found in the cases of where the coalescence of *se* + *l* > *t* has taken place.
[25] Rilly (2005:388) believes that ⅄ - *ne* in the majority of cases where it is found word-finally, has a purely consonantal value.
[26] The frequency of the combination *ne* + *y* was explained by Hintze (1987:44) as resulting in the borrowing of this sign into the Old Nubian script for the phoneme [ɲ] representing a palatal nasal. Cf. Rilly (2005:390) for a phonetic analysis of this borrowing.
[27] Meroitic is considered an agglutinative language and is therefore morphologically derivational. The demarcation between a word and a morpheme in Meroitic is another area that needs further systematic investigation. For present purposes, I am terming any forms with affixes attached as morphemes.

(6)   Occurrences of ∠∕∕∕ - *se*

-se#	85	-ses	3
-se-l	39	-sed_	3
-se+ l > t	30	-sem_	3
-set_	17	-sene	3
-seb_	13	-sey_	2
-sew_	7	-ser_	1
-sen_	5	-seh_	1
-sek_	4	-se<u>h</u>_	0
-seq_	4	-sep_	0

The highest occurrence of ∠∕∕∕ - *se* is word-finally. The second highest placement is when followed by -*l*-. These occurrences are mainly from the earlier phase of Meroitic texts before the coalescence rule of *se + l > t* has taken place (see §4.5). Again, these are the articles -*l*-, *li*, *lw* and the adjective *l<u>h</u>*, showing that ∠∕∕∕ - *se* is occurring morpheme-finally. The coalescent instances of *se + l > t,* mainly provided by the later texts, shows these two signs cannot be separated by a vowel for this process to take place. As the frequency of their occurrence is high, this evidence points to the sign having no vocalisation inherent within its phonemic attribution.

4.1   Loans showing no vocalisation of the 'syllable' signs
In this section I draw upon a collection of data which are mainly taken from Griffith (1911:13-14; 1916:113-122) and Rilly (2005) where equivalences can be found among Egyptian, Greek, Coptic and Latin words with Meroitic that indicate there was no vocalisation following the 'syllable' signs.

Both of the toponyms in (7) and (8) show no word-final vocalisation in their equivalent forms and as such, the Meroitic form uses the 'syllable' sign ∠∕∕∕ - *se* thereby indicating no following vocalisation.

(7)   Toponym   Meroitic   ∠∕∕∕ ∠ ß   -*Nbse* /nabas/   "Pnoubs"
                 Egyptian (*Pr-*)*Nbs*
                 Greek   Πνούψ
                 Latin   Nups

(8)   Toponym   Meroitic   ∠∕∕∕ ⬡ ʒ₹ *P<u>h</u>rse* /pa<u>h</u>aras/ "Faras"
                 Greek   Παχωρας
                 Coptic   ⲡⲁⲭⲱⲣⲁⲥ

(The following forms in (9) and (10) are here analysed initially, although, the proposal put forward in §5.3.2 should be taken into consideration with the phonetic realisation of these forms that also rests upon the analysis given in §4.3. Furthermore, although I use the phonemic transcription of the following forms for clarity, the proposal put forward in §4.3 that ə is a surface vowel applies).

In (9) the Meroitic equivalent uses the 'syllable' sign (uncommonly) word-initially. Where the Greek form has the sequence 'Σμ' - /sm/, if there is no vocalisation on the 'syllable' sign then the Meroitic form also begins the name with the sequence /sm/.[28]

(9) Anthroponym Meroitic 𝓎𝓎𝓈𝓏𝓋//   *semeti*   /sm.../
                 Demotic *Is-mt*
                 Greek   Σμιθις

The 'syllable' sign /𝓎- - *te*, in (10), is placed word-initially in the Meroitic form where it is compared to the Egyptian and Coptic forms that indicate the feminine article *t-*, which 'in Coptic has only the faintest vocalisation is rendered by t ϥ [in Meroitic]' (Griffith 1916:119), (confusingly, this form is not transcribed with 'tϥ' - the inherent 'a' sign 𝓎 - *t* with the vowel sign ϥ - *e* as Griffith wrote, but the syllable sign /𝓎- traditionally transliterated as *te*). As the Meroitic equivalent positions the 'syllable' sign /𝓎- - *te* word-initially to transcribe this form where there is no vowel following the *t* or ⲧ in the definite article of the Egyptian and Coptic forms, it can be deduced that this sign is used because there is no inherent vowel.

(10) Noun   Meroitic 𝓎𝓎𝓋// 𝓎ᵟ/𝓎   *tewiseti* /twisti/ "the adoration"
             Egyptian *t(ꜣ)-wšt.t*
             Coptic   ⲧ-ⲟⲩⲗⲱⲧⲉ[29]

Further evidence for there being no vowel in the Egyptian/Coptic article comes from Peust (1999:127) in his study of Egyptian phonology where he states that 'Since the sound written <ꜣ> had already merged with <j> by the New Kingdom and was completely lost in Coptic in most positions.'[30] Moreover, evidence for there being no vocalisation on the Coptic definite article that corresponds to the Meroitic form is that in the Sahidic dialect of Coptic there are two forms of the definite article:[31]

(11)   masc. sing.   fem. sing.
   short form ⲡ-   ⲧ-
   long form ⲡⲉ-   ⲧⲉ-

The short forms have two occurrences: (i) before a vowel and (ii) before a consonant followed by a vowel. The long form precedes nouns beginning with two consonants (Stern 1880). In the Coptic form ⲧ-ⲟⲩⲗⲱⲧⲉ it is the short definite article that is used as there is a consonant – ⲟⲩ followed by a vowel ⲗ.[32]

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[28] I am giving the traditional phonological representation of fig. (9) and (10) in slash bracketing although see §4.3, where I claim at the phonological level ϥ is unrealised; and §5.3.2 for a further discussion into the phonetic realisation of the forms with 'syllable' signs word-initially.

[29] Peust (1999:61) states that 'in both Sahidic and Bohairic, ⲟⲩ is the only way to express /u/ or /w/ in most environments.'

[30] Cf. Loprieno (1995), for the phonemic assignation of <ꜣ> as /ʔ/ and Peust (1999:127-128) for more on the liquid character of <ꜣ>. Also, see the discussion on the phonological interpretation of these proposals in Reintges (1994:215-218).

[31] Cf. Depuydt (1993:363) for more on the distribution of the definite articles with a proposal that the appearance of the long definite article is due to syllabification principles.

[32] Cf. Hintze (1980:40) for ⲟⲩ as /w/.

This points to there being no vocalisation after the initial coronal stop *t-*, in the Egyptian and Coptic forms and that the Meroites were able to transcribe this form with their 'syllable' sign /�- - *te* because it functions with no inherent vowel. This comparison adds to the proposal that phonemically /�- - *te* is a plain consonant sign.[33]

Secondly, the Coptic form ⲧ-ⲟⲩⲁⲱⲧⲉ also shows that the sibilant ⲱ /ʃ/ and the coronal stop ⲧ /t/ are not separated by a vowel (word-medially). The Meroitic equivalent ↯ᵹ◡⁄⁄ ↯ᴕ/�- - *tewiseti* positions the 'syllable' sign ◡⁄⁄ - *se* before the ᵹ - *t* sign, this evidence also contributes to the proposal that there is no vowel inherent in the ◡⁄⁄ - *se* sign.

In (12) we find the masculine article in Egyptian – *p3,* although the vowel has disappeared by the Coptic stage. In the Coptic equivalent the short form of the masculine singular definite article is used as there follows a consonant ⲣ followed by a vowel ⲏ, where we see that the Meroitic form inserts the ϛ - *e* vowel sign (see the discussion on the Meroitic ϛ - *e* vowel inserted not as a zero-vowel indicator but as an epenthetic vowel in §5). The Coptic form shows the word is consonant-final and its Meroitic equivalent writes the /�- - *te* sign also indicating a consonant-final form.

(12) Title   Meroitic /�- ↯ⲱ ϛᶘ *perite*   /..rit/   "the agent"
          Egyptian *p3-rṯ*
          Coptic   ⲡⲣⲏⲧ

The Meroitic toponym in (13) uses the ◡⁄⁄ - *se* sign word-initially where the Greek form begins with the phoneme /t/. Rilly (2005:379) observes that the transcription of /s/ in Meroitic for the *tau* /t/ in Greek is strange and he asks whether it could be an instance of 'Griffith's law'.[34] If this is an example of 'Griffith's law' then we expect the /s/ and /l/ phonemes to be in immediate contact and not separated by a vowel. Hence, the ◡⁄⁄ - *se* sign is written, as it does not contain a vowel.

(13) Toponym   Meroitic ϛᵹϛᵹ◡⁄⁄ *selele*   /sl…/   "Shellal"[35]
          Greek   Τελημς

4.3 Vowel raising following coronals
This section puts forward the claim that there is a process of vowel raising following the coronal consonants /s, n, t/ in Meroitic. This phonological analysis can explain why there is the omission in the script of the inherent unmarked 'a' coronal signs ᵹ - *t* /ta/, ᴣ - *s* /sa/ and ⟨ - *n* /na/ followed by the vowel sign ϛ - *e*.

Griffith (1916) noticed that the 'consonant' signs with the inherent unmarked 'a' vowel ᵹ - *t* /ta/, ᴣ - *s* /sa/ and ⟨ - *n* /na/ are very rarely followed by the separate vowel sign ϛ - *e* (but are commonly followed by the vowel signs ↯ - *i* and / - *o*). This led him to deduce, through logical equation, that the 'syllable' signs (which share a

[33] See f.n 28.
[34] /s/ + /l/ > /t/ found in numerous examples in the texts, which has traditionally been referred to as 'Hestermann's sound law', Rilly (2005:412-417) calls for a review of this law to be attributed to Griffith.
[35] Griffith identified Meroitic *Selele* with modern 'Shellal' (1912:30) also see Zhylarz (1930:417) for the Meroitic and Greek association. Cf. Vycichl (1958:178) for discussion.

consonantal equivalence with the inherent 'a' signs) therefore must inherently contain the ⅄ - *e* vowel.[36] In his observation of the occurrences of the ⋏ - *ne* sign never being followed by a vowel sign, Griffith (1916:117) stated that 'The natural conclusion is that ⋏ = *ß* [*n*] followed by ⅄ [*e*] and I do not see any cogent objection to this on other grounds.' Griffith was writing at a time when the field of linguistics was very new and so is logically trying to account for a seeming 'gap' in the written language. But is it that this 'gap' actually exists in the spoken language?

What is interesting about these 'syllable' signs is that they belong to the phonological natural class of coronals.[37] I am putting forward the proposal here that these coronals /s, n, t/[38] in Meroitic affect the following vowel by raising it, as is widely attested cross-linguistically (Hume 1994).[39] The following data is taken from a contrastive analysis of written Tibetan with spoken Llasa Tibetan (Michailovsky 1975 and Brush 1997) showing a phonological process whereby the coronals /d, n, r, l, s/, when in the coda (syllable-final), of the written Tibetan, affect the quality (and at times the quantity) of the preceding nucleus (vowel) in spoken Llasa Tibetan:[40]

(14a) | Written Tibetan | Lhasa Tibetan | gloss |
|---|---|---|
| sman | mɛ̄ɛ̄ | 'medicine' |
| bal | phɛɛ | 'wool' |
| chad | tçʰɛ | 'break' |
| nas | nɛ | 'barley' |
| çar | ça: | 'east' |

(14b) | | | |
|---|---|---|
| tham | tʰam | 'tight' |
| thag | tʰaʔ | 'rope' |
| thang | tʰaŋ | 'ground' |

In the written Tibetan forms (14a) the low vowel [a] is raised in the Llasa Tibetan spoken forms resulting in [ɛ] when a coronal consonant is in the coda. The data in (14b) shows the low vowel does not raise when a non-coronal segment is in coda position.

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[36] I am aware of Griffith's (1911:38) further observation for the analysis of the /⅄ - *te* sign with *e* represented inherently, but for now I am only dealing with the statistical observation he made as to why the 'syllable' signs should include the *e* vowel, see Rowan (forthc.) for more on the /⅄ - *te* sign.

[37] Coronal consonants are made with the tip or blade of the tongue and the place of articulation is normally dental and/or alveolar.

[38] The sign transliterated now as *d* does not partake in this same process, even though it 'seems' to be of a coronal place of articulation. This Meroitic sign ⋋ was provisionally assigned the value *z* by Griffith (1911:16) who upheld this view in a later paper (1916:117). However, Griffith queried this assignment in his paper of (1917b:170) and later (1929:71) revised it to *r*. The scholar Macadam (1966:52) proposed that it is more likely to be an alveolar retroflex [ɖ] and therefore the transliteration of this sign was changed to *d,* see also the discussion in Rilly (2005:365-371). See Rowan (forthc.) for more on the phonological analysis of this discussion and as to why the Meroitic liquid coronals /r, l/ also do not affect the vowels.

[39] Also cf. Janson (1986:187), in a paper on a corpora study involving cross-linguistic trends with CV sequences, who concludes that 'the main result for sequences of a dental/alveolar consonant and vowel is that sequences with a front vowel definitely tend to be favoured.' Cf. Moscati *et al.* (1964:42) for vowel fronting in Akkadian, an ancient language known through its script.

[40] For discussions and phonological analyses of this process cf. Michailovsky (1975), Hume (1994) and Odden (1991).

Briefly, the process of vowel raising involves the change of height quality of a vowel. Vowels are traditionally distinguished from one another through the positioning of the tongue body and the shape of the lips. Conventionally, the representation of the vowel space is shown in the diagram of (15a):
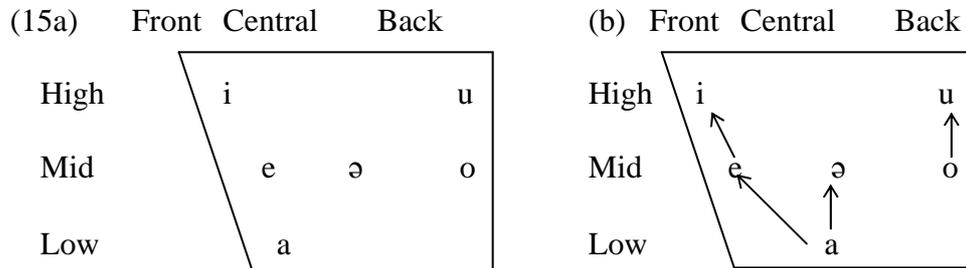
Vowel raising (15b) is shown where a low vowel such as /a/ can raise to a mid vowel - /e/, /ə/ and even to the high vowel - /i/. It follows that the mid vowel - /e/ can also raise becoming the high vowel - /i/, along with the back mid vowel - /o/ raising to a high back vowel - /u/.

The Tibetan data (14), even though a small piece of evidence, is interesting in that it shows the process between the script and the language whereby coronals trigger the vowels to raise. This process is very common cross-linguistically (Hume 1994; McCarthy 1994a) and is especially found for the vowels that follow coronal consonants.

I put forward that the vowel raising phonological process is functioning in Meroitic. This means that in the orthographic forms where we find the inherent unmarked 'a' signs ⟨ - t /ta/, ⟨ - s /sa/ and ⟨ - n /na/ they are actually phonetically realised with a following front mid-vowel at surface form (16):[41]

(16) Meroitic Transliteration Underlying form Surface form

Meroitic	Transliteration	Underlying form	Surface form
	t	/ta/	[te]
	s	/sa/	[se]
	n	/na/	[ne]

This process can be captured with the phonological rule as in (17):

(17)   a → e/ {t, s, n} _____

The Meroitic script notates four vowels; the inherent 'a' vowel contained within the consonantal signs, e.g. ⟨ - *b* 'a' etc., the high vowel ⟨ - *i*, the back vowel ⟨ - *o* and ⟨ - *e*.[42] At this stage of my investigation I do not consider that the vowel sign ⟨ - *e* has an underlying representation, but it is pronounced at surface (phonetic) form

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[41] I am using here the vowel [e] to represent the Meroitic front mid-vowel although it is unclear as to the actual tense/lax realisation of this vowel at present. This process would indicate that [e] is only found at surface form and therefore is not a lexical vowel – see Rowan (forthc.).

[42] For alternative discussions on the Meroitic vowels cf. Griffith (1911, 1916), Hintze (1973b; 1974), Zawadowski (1972) and Rilly (2005).

(§4.3.1 adds to the body of evidence for this claim).[43] Therefore, I propose that there are only three vowels at the phonological level (slash bracketing):

(18)   /i/   /u/

              /a/

The process of the coronal consonants /s, n, t/ raising the following vowel means that the surface form (phonetic realisation) of the vowels following these coronals will be as in (19a) whereas the vowels following all other consonants is shown in (19b):[44]

(19a) SF of vowels after coronals (19b) SF of vowels after all other consonants
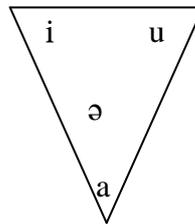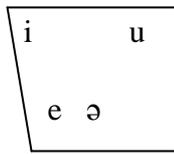
Shown in (20) is the underlying representation of the vowels (in slash bracketing) whereby the low vowel /a/ raises to the surface form [e] after the coronal series /s, n, t/:

(20)   /i/   /u/

This process is shown in (21) giving the orthographic, phonological and phonetic representations:

(21) ʁ   /na/ → [ne] ~ [nə]   ꒳   /sa/ → [se] ~ [sə]   ⅄   /ta/ → [te] ~ [tə]
     ⅄ʁ /ni/ → [ni]   ⅄꒳ /si/ → [si]   ⅄⅄ /ti/ → [ti]
     ／ʁ /nu/ → [nu]   ⅄꒳ /su/ → [su]   ⅄⅄ /tu/ → [tu]

This phonological analysis can explain the 'gap' in the written Meroitic texts whereby there are no occurrences of the inherent unmarked 'a' signs: ⅄ - *t* /ta/, ꒳ - *s* /sa/ and ʁ - *n* /na/ followed by the separate vowel sign ꙅ - *e*. If the vowel sign ꙅ - *e* was a lexical (underlying) vowel we would expect to find the written sequences *ꙅʁ - *ne*, *ꙅ꒳ - *se* and *ꙅ⅄ - *te* where the vowel would then raise giving the phonetic realisations *[ni], *[si] and *[ti]. However, these written sequences are not found.

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[43] Languages such as French and Turkish also do not contain a schwa vowel in their underlying phonological inventories but this vowel is realised at the surface form. My research into the vocalic inventory of Meroitic is ongoing see Rowan (forthc.).

[44] However, the precise phonetic realisation (tense/laxness) of these vowels can only be speculated.

Accordingly, the gap that really exists in the language is a phonetic one, because of vowel raising, where it is the sequences *[sa], *[na] and *[ta] that are missing.

4.3.1   Equivalents with coronals + e

Further support for the proposals already given, these being; (i) the 'syllable' signs do not contain a vowel; (ii) vowel raising is triggered by the preceding coronals /s, n, t/ and; (iii) ϛ - *e* is not a lexical (underlying) vowel, comes from data taken from Griffith (1916). Griffith (1916:119) stated the importance of this data:

> Transcripts by Meroitic scribes in the third century A.D. of Egyptian names…ought to furnish particularly reliable guides to the values of the vowel signs, especially as Coptic equivalents and Greek versions give a very good idea of what the vocalisation of the names must have been at that time.

It should be noted that this data should be analysed with a cautionary view as it deals with the vowels of loans (see §5). As such, because vowels are particularly unstable, their representations from one language into another are not 'particularly reliable guides.' However, if the process of coronals triggering the following vowel to raise is taken into account, the data from Griffith (1916) enables us to explain the change in the vowel that is represented.

Throughout the data (22), we expect the Meroitic forms to notate a mid-vowel, as found in the equivalent forms, but we find instead a high front vowel. This data is interesting as it shows the mid-vowel of the equivalent forms is not interpretable in Meroitic when preceded by the coronal series /s, n, t/. This is because a coronal + [e] is the surface realisation of a coronal + /a/ in Meroitic. Therefore, equivalent forms containing a coronal + mid-vowel will be raised in Meroitic resulting in the sequence coronal + high front vowel ([i]).[45] Furthermore, this adds to the claim that ϛ - *e* cannot be present underlyingly in the Meroitic phonological inventory.

A further pertinent point is that the 'syllable' signs are not used to notate these equivalences whereas if they were we would have conclusive evidence of the 'syllable' signs containing a vowel.

Griffith goes on to say that 'If the vocalisation of a word is known some kind of explanation of the reasons for the use of the vowel signs in [Meroitic] writing can be given…' (1916:121). It is shown in the following discussion of Griffith's data (1916) that where equivalent forms position a front mid-vowel 'e', Meroitic transcriptions interpret this vowel as a front high vowel - ⴄ - *i* [i] when the consonant that precedes is coronal. In all the data of (22), the coronal unmarked 'a' signs Ꝫ - *s* /sa/, ꞵ - *n* /na/ and ⅄ - *t* /ta/ are found followed by the vowel sign ⴄ - *i* [i], giving the sequences [si], [ni] and [ti].

(22a)   The name of the queen of Amenhotp III is rendered Teie, *i.e.* Teye, in the Armana tablets. The name of the city dedicated to her in Nubia was therefore pronounced Ha-Teye and appears in Meroitic as ϛ /// ⴄꝭꝫ (1916:119)

The transliteration of the form of (17a) 'Ha-Teye' is *atiye* (ϛ /// ⴄꝭꝫ) in Meroitic. It is seen that the original Coptic (?) 'Ha-**te**ye' has a mid-vowel following the coronal

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[45] McCarthy (1994a: 4), uses data taken from Abboud (1979), showing the raising of the low vowel /a/ to the high vowel [i] in the Najdi dialect of Arabic: /katab+at/ > [ktibat] 'she wrote'; /nataf+aw/ > [ntifaw] 'they (m.) pulled feather'; /samiʕ/ > [simiʕ] 'he heard'; /galam+ih/ > [glimih] 'his pen'.

consonant where we find the vowel is interpreted in the Meroitic form as [i] not 'e' - *ati*ye following the coronal ⟨⟩ - *t*.

(22b)   It was the Pharaohs of the New Kingdom that introduced Ammon into Nubia and established his worship in temples throughout the country from Debod to Napata, and it is easy to trace the origin of the Ethiopian form in the New Kingdom pronunciation which is rendered Amānu, Amāna in the cuneiform of the Amarna tablets. The Meroitic-Greek –αμενης and the Ethio-Assyrian -amanē indicate for ⟨⟩ (⟨⟩) the pronunciation Amănē or Amănĕ. (1916:119)

The Ethio-Assyrian equivalent 'ama**nē**' shows a mid-vowel following the coronal nasal, the Meroitic form, where its transliteration is *am**ni*** ⟨⟩ (⟨⟩) and its transcription is /ama**ni**/, shows that this mid-vowel is interpreted as [i] in Meroitic, again when preceded by the coronal nasal ⟨⟩ - *n*.

(22c)   (T-)shapshi (in Old Coptic…) or (T)shepshe, Mer. *š* ⟨⟩*š* ⟨⟩(y⟨⟩). (1916:119).[46]

The Meroitic form is transliterated as *sipesi(ye)*((⟨⟩) ⟨⟩) where both the vowels are interpreted as ⟨⟩ - *i* [i] following the coronal ⟨⟩ - *s*, where the Coptic equivalent shows the mid-vowel 'e' *shepshe*.[47]

(22d)   Pa-Êse, Ta-Êse   Mer. *Py*⟨⟩*š* ⟨⟩, *Ty*⟨⟩*š* ⟨⟩ (1916:119).

The Meroitic forms are transliterated as *Pyesi* (⟨⟩) and *Tyesi* (⟨⟩).[48] In both forms the Coptic word-final mid-vowel 'e' follows the coronal 's', the Meroitic equivalents both show they are interpreted as the front high vowel ⟨⟩ - *i* [i] following the coronal ⟨⟩ - *s*.

(22e)   With these may be associated the transcript of the following Egyptian word: t-washte or t-weshte Mer. *t*⟨⟩*w* ⟨⟩*s*⟨⟩(?)*t* ⟨⟩. (1916:119).[49]

The Egyptian forms have a word-final mid-vowel 'e' (t-washte ~ t-weshte) which again is interpreted in the Meroitic equivalent (⟨⟩ ⟨⟩) *tewise**ti*** with the front high vowel ⟨⟩ - *i* [i].[50] In this instance, we again find this change of vowel following the coronal ⟨⟩ - *t*.

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[46] See Peust (1999:223) for a discussion on Coptic vowel shifts ("chain-shifts").

[47] As there is no uniform transliteration practice for Coptic, it cannot be ascertained from Griffith's transliteration of the Coptic equivalents as to the exact representation of the vowel he transcribes as 'e'. It is unclear at present whether these equivalents are written with ε /ɛ/or н /e/, although this does not detract from the observation that the Meroitic transcribed forms the vowel is interpreted as a front high vowel.

[48] As there are two vowels adjacent in the Coptic forms – 'Pa-Êse, Ta-Êse' Meroitic writes the glide /// - *y* to break up this vowel sequence.

[49] The Meroitic form is confusingly transliterated by Griffith as *t*⟨⟩*w*⟨⟩*s*⟨⟩(?)*t*⟨⟩, he queries his positioning of the ⟨⟩ - *e* vowel as this form is actually written with the 'syllable' sign – ⟨⟩ ⟨⟩ therefore (following the standard practice) it should be transliterated as *tewiseti*. See §1.2 for Griffith's analysis of this.

[50] It is observed that in this example the vowel following *w* in the Meroitic form has also changed.

This data indicates that Meroitic interpreted the loans as a coronal + [i] and not coronal + [e], since in Meroitic coronal + [e] is the result of the phonological process as in (17) where: a → e/ {t, s, n} ____.

Furthermore, from these equivalences, we have to ask the question that if the three 'syllable' signs ⅄ - *ne,* ⳑⳑⳑ - *se* and /ᒧ - *te,* really do represent a coronal consonant with an inherent mid-vowel why are they not found in the cases where we expect to find them, as of above? If, in the data of (22), the 'syllable' signs were used to transcribe these names, then this would be firm evidence for their traditional phonemic representation of containing a mid-vowel. However, since we do not find them, this section adds to the body of evidence that there is a distinct phonological process of vowel raising following the coronal series /s, n, t/ and that ϛ - *e* cannot be phonologically underlying.

4.3.2   Vowel neutralisation

A process of diachronic vowel neutralisation is seen on a few lexical items in Meroitic that have been semantically identified. Rilly (2005:395) states that this neutralisation takes place in the first century CE where this dating is established upon palaeographic grounds. He proposes that the reduction of /a/ is probably due to the positioning of the vowel in the word or to the force of tonic stress. Rilly (2005:398) reconsiders the case of the ϛ - *e* sign and puts forward the proposal that in fact it represents two phonemes /e/ and /ə/ where the schwa can be realised as a schwa or simply the absence of a vowel.[51]

The forms in (23) are given showing an instance of this vowel neutralisation with phonemic transcription in slash brackets:[52]

(23)
 (a) Early written form   Late written form
        ↩3ϛ{ *pesto*[53]/pesatu/ → ↩ⳑⳑⳑϛ{ *peseto*[54] /pesetu/ ~ /pesətu/   "Viceroy"

 (b) ⅄ℛϛ⅏ *ant*[55] /anata/[56] → ⅏ϛ⅏   *at*[57]   /anta/   "priest"

Under this analysis: /a/ > /e/ > /ə/ > /ø/   ~   /a/ > /ə/ > /ø/.

I would like to advance a reanalysis of this neutralisation taking into account the proposal put forward in §4.3. Namely, if we analyse the phonological underlying representation (UR) of ꜣ - *s* /sa/ as being [se] at phonetic surface form (SF) the neutralisation that takes place during the first century CE is better accounted for. This is due to the mid-vowel being perceptually closer to [ə] and is therefore more likely to reduce.

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[51] Rilly (2005:396) ties up the contradiction made by Hintze (1973a; 1973b), as to the transcription of the *e* sign.

[52] Although, it is remembered that I claim that *e* is not an underlying vowel.

[53] REM 0453, 0521, 1003 dated as early texts.

[54] REM 0277, 0544, 1063, dated as late period texts. Cf. Griffith (1911) for dating of texts and Rilly (2004, 2005).

[55] REM 0453, 1003 dated as early texts.

[56] Rilly (p.c.) also proposes the transcription /annata/. Cf. Coptic equivalent ϨⲞⲚⲦ.

[57] Late period form.

(24)[58] ⌣3ᔕ᛭ *pesto* UR - /p satu/ →   SF [pəsetu] > [pəsətu] > [pəstu] = ⌣ʋ//ᔕ᛭
peseto

In the case of the title "Viceroy" (24), the Meroitic written form of the later texts uses the 'syllable' sign ʋ// - *se*, whereas the early form uses the inherent unmarked 'a' sign 3 - *s* /sa/. The proposal that the [e] vowel is the surface form of underlying /a/ after the coronal series (3 - *s,* ⋏ - *n,* ⅋- *t)* which then reduces to schwa [ə] and further to complete vowel loss (syncope) is substantiated by the evidence of the later written form using the 'syllable' sign ʋ// - *se*, and thus showing no vocalisation between ʋ// - *se* and ⌣ - *to*.[59]

Moreover, this same analysis can be applied to the change to the written forms for "Priest" as in (25):

(25) ⅋ß ᔕ᛭ *ant* UR - /anata/ → SF [anete] > [anətə] > [antə] = ⅋ᔕ᛭ *at*

The inherent unmarked 'a' nasal sign ß - *n* /na/ is used in the earlier texts (⅋ß ᔕ᛭) which gives [ne] at surface form where the vowel is then neutralised to [nə], this vowel can then reduce further to complete syncope resulting in the nasal and coronal being adjacent and, as Meroitic scholars have seen, the nasal is not written in coda (closed-syllable) position in Meroitic which results in the late form ⅋ᔕ᛭ *at* being written. This writing practice is now discussed in the following section.

4.4 Nasal + consonant clusters in the Meroitic script
It has long been accepted within the field of Meroitic studies that a nasal consonant in word-internal coda position is not written in the Meroitic script. Griffith (1911:22) gave the first indication into this supposed practice when he stated:

> The writing indicates that the words consisted mainly of open syllables commencing with a consonant. There were also closed syllables, as is shown by the Greek transcriptions Ἐργαμένης, Κανδάκη.

Griffith (1916:120) specifically outlined this convention: 'the omission of n is a constant phenomenon in Meroitic writing.' Rilly (2005:389) gives a list of equivalent forms where there are nasal consonants in coda position, but which are unwritten in the Meroitic forms. Fig. 26 lists this data:

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[58] To avoid confusion at this stage of my analysis I am notating the sign ⌣ *to* phonemically in this title, although it will be seen in §5 that I argue against consonant clusters in Meroitic so the sequence /st/ is disallowed. I therefore query whether this sign has any phonological realisation in this form and refer the reader to the discussion in §4.6. Compare the Egyptian equivalent written without /t/ i.e. *p sj-nsj*. Further, as I consider the vowel sign *e* is not underlying the blank space in the UR represents this.
[59] The Greek equivalent of this form is ψεντης that transcribes a nasal consonant preceding the coronal /t/. Cf. Rowan (forthc.) on an investigation into the possibility of a process of truncation of the nasal segment in Meroitic. Also see Schwyzer (1934) for an investigation into Greek nasal + stop sequences arising from cross-linguistic geminates i.e. tt > nt.

(26)

(a)	Mer.	*Arikhror*	Eg.	*ʾIrknḫrr*		
(b)	Mer.	*Arette*	Eg.	*ḥr-**nd**-it = f*	Gr.	Ἀρενδωτης
(c)	Mer.	*ḫs* (?)	Eg.	*hnsw*	Gr.	Χόνς
(d)	Mer.	*Wyekiye*	Dem.	*wy**n**gy3*		
(e)	Mer.	*ktke, kdke*	Eg.	*kntiky*	Gr.	Κανδάκη
(f)	Mer.	*peseto*	Eg.	*p sj-**n**sj*	Gr.	Ψεντης
(g)	Mer.	*arebetke*	Dem.	*3rbt**n**gyˁ*		
(h)	Mer.	*at*	Eg.	*ḥm-**n**tr*		Coptic ϩⲟⲛⲧ

Rilly (2005:388) states that '*Enfin, comme nous l'avons vu auparavant, il n'est pas écrit, sauf exception, lorsqu'il correspond à une consonne simple devant les graphemes ḫ, k, d, t et sans doute ẖ.*'

Primarily, the question has to be asked as to why the Meroites did not notate a nasal coda segment in the script (that was apparently present in the spoken language) even though they possessed an assumed zero-vowel indicator (namely the *e* vowel included in the 'syllable' nasal sign 𐦠 - *ne*)? If this were the correct representation of this sign, this would have enabled the Meroitic scribes to notate the absence of a vowel between the nasal in the coda position and the following consonant - *𐦵𐦠 - *ned - /nd/.

Taking the oft-cited example for this phenomenon, a female title in Meroitic is written as *ktke ~ kdke*, although it is believed to be pronounced as /kantake/ ~ /kandake/, vocalised with a word-internal nasal + stop sequence based upon the Greek transcription - Κανδάκη. It is strange that we do not find this Meroitic word written as *𐦲𐦵𐦠𐦲 - *knedke*, with the written sequence *ned* representing phonemically the sequence /nd/. In fact there is no evidence of the 𐦲 - *e* sign written between the nasal + stop sequences of all the comparative data in (26), this in itself is another factor to be taken into account towards the proposal that 𐦲 - *e* is not a zero-vowel indicator (see discussions in §5) *if* there is indeed a nasal + stop sequence in the Meroitic forms.[60] Consequently, we are left with the supposition that the nasal segment is left unwritten as has been adduced from the comparative data of Egyptian, Demotic, Coptic and Greek.[61]

This orthographic omission of the nasal segment adds evidence to the claim that there is not always a direct mapping between the orthographic and phonetic levels of the Meroitic script.

4.5 Assimilation and coalescence of 'syllable' signs

Two processes that are well-attested features of the Meroitic script are the assimilation of the 'syllable' sign 𐦠 - *ne* (*ne + l > ll*) and the coalescence of 𐦷 - *se* (*se + l > t*) when both signs are adjacent to the lateral 𐦷 - *l* (§3.1: §4.1) usually the determiner.[62] For this assimilation to take place the consonantal segments must be in immediate contact with no intervening vowel as Hintze and Millet rightly claimed. This assimilation process led Hintze (1973a:330) to make the proposal that it could be

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[60] Cf. f.n. 59. Cf. Priese (1973:288) and Hofmann (1981:34-5).

[61] However, it is noted that the written omission of a nasal segment of an NC cluster is also seen in other writing systems such as Old Persian and the Cypriot syllabary.

[62] I follow Rilly (p.c.) here for the term "determiner" as opposed to "article" for –*l* and –*li*.

accounted for if the *e* vowel of the 'syllable' signs also ambiguously represents a zero-vowel. Some examples of this process are found in (27):

(27) Stem   Stem + determiner
    sleqene   ~   *sleqe-l*
    ḫbḫne   ~   *ḫbḫ-l*
    ḫrpḫene   ~   *ḫrpḫe-li*   [Hintze 1979:62]

The nasal 'syllable' sign ⅄ - *ne* is not written in the forms with the suffixed determiners as Hintze (1973a:330) proposed because the lateral has assimilated the nasal by being in immediate contact. This results in the lateral geminating; however, this is not seen in written in the script, which does not notate geminates.[63]

   The coalescence of /s/ + /l/ resulting in /t/ first noticed by Griffith (1911:38) was also given as evidence by Hintze (1973a:330) that the *e* vowel of ᴗ/// - *se* doubles as a zero-vowel indicator in order for this coalescence of /s/ + /l/ resulting in /t/ to take place.[64]

(28) Actual form   Coalescent written form
    smleyoselo >   *smleyoto*   (REM 1088)
    womniselḫ >   *womnitḫ*   (REM 1088)
    adbliselo >   *adblito*   (REM 0098)

These assimilatory processes show that the ⅄ - *ne* and ᴗ/// - *se* 'syllable' signs function as plain consonants. The argument Griffith gave for the inclusion of the *e* vowel in the 'syllable' signs was only due to no instances in the texts of where the separate ꟲ - *e* sign follows their consonantal equivalents ⱴ - *n* and ꝫ - *s*. However, the phonological proposals of the vowels raising following the coronal series /s, n, t/ and that ꟲ - *e* is not underlying which were put forward in §4.3 should be taken as a 'cogent objection', and, consequently, the reason as to why this occurrence is never found is accounted for. We should, therefore, remove the instance of the *e* vowel being inherent in ⅄ - *ne* and ᴗ/// - *se*, and thus we are left with plain consonant signs. Once this ambiguous assignation is removed from the 'syllable' signs, there are implications on the analysis of the vowel sign ꟲ - *e* having the dual representation of a mid-vowel or zero-vowel. This is investigated in §5. Before this investigation can be put forward a discussion follows on problems with the analysis of ⅄ - *ne* and ᴗ/// - *se* as plain consonant signs.

4.6 Problems with the hypothesis

There exists data in the Meroitic texts that poses a problem with the proposal that the 'syllable' signs are plain consonantal signs. I am including here in the discussion the assumption that the 'syllable' sign /� - *te* is also a plain consonant sign /t/.[65] This analysis is tentative at present, but as the combination of the 'syllable' signs mainly

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[63] '..doubling of consonants is not expressed in writing', Hintze (1974:74).
[64] For discussions on the phonetic/phonological reasons for this assimilation, cf. Vycichl (1958:75), Millet (1973), Böhm (1987:11) and Rilly (2005:416-17).
[65] Cf. Aubin (2003) for an epigraphic proposal to revise the transliteration of *te* > *d*.

includes the /ᗡ̵ - *te* sign, an in-progress hypothesis is put forward. Listed below (29) is a sample of data where this problem can be seen when two (or more) 'syllable' signs are in succession with no intervening signs:

(29) *Aritene*   (REM 0094)   *Mnptese* (REM 0094)
    Yiseḫteteyeqo (REM 0094) *Netewitror* (REM 0544)
    Akinete-lo (REM 0247)   *Pḫrsete-lo* (REM 0247)
    Tmnete-lo (REM 0247)   *Netewitr-qowi*   (REM 0278)
    Amnptese (REM 1044)   *Mnptese* (REM 0094)

The occurrence of consecutive 'syllable' signs poses a problem with the proposal that these signs function only as plain consonant signs. What we find in these instances is consonant clusters that are claimed to be impossible as they violate Meroitic syllable structure (CV, CV(C)).[66] This means we would find sequences such as - /aritn/ (*Aritene*) which will be disallowed by the syllabic structure.

It is known that the data (29) all show proper names, theonyms, anthroponyms, toponyms or a combination of both (*Amnptese* theonym + toponym "Amûn of Napata").[67]

   Due to the fact that these words all seem to share a class, I was intrigued to investigate whether the proposal could be put forward that the Meroites were using signs with a polyvalent value which means they could also function as semantic indicators or more specifically, based upon Ancient Egyptian, determinatives and/or ideograms, rather than the accepted view that they are grammatical morphemes carrying phonetic or phonological value in these instances.

4.6.1   Polyvalence in the Meroitic script

A distinct feature of the Ancient Egyptian script is the polyvalence of its signs. A sign could function as a phonogram, determinative and/or ideogram. Determinatives were usually written following the word they pertained to. Words could be written with one or more determinatives. The main function of determinatives was to identify a word as belonging to a certain category and so are termed 'generic determinatives'. These 'generic determinatives' could cover a wide-range of categories such as people, gods, animals, places etc. In this sense, they function as semantic indicators, with recent research investigating the importance of determinatives as category markers using linguistic Proto-type theory (Goldwasser 1995; Shalomi-Hen 2000).[68]

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[66] See §5.3 for more on this.

[67] Another form that occurs is *teneke-l* which Griffith believed indicated a geographical term (1916: 113), see Rilly (2000) and Peust (2000) for different semantic interpretations of the construction *netese* which occurs in a few Meroitic royal steles. Also, see Rilly (1999a) who has noted that there is a difference in the 'genitive' construction when proper names are found. The 'genitive' postposition 'syllable' sign ⊔// - *se* directly follows the names of gods (a) rather than following the article as in other names (b):

(a)*ant   Wos   -se*   (b)   *ttne   lḫ   peseto –li –se*
  nom A nomB   postp.   nomA adj. nomB   det. postp.

[68] 'Determinatives are related to the word preceding them in two main ways: metaphoric or metonymic, i.e., categorical or schematic. Together they form part of domain. Sometimes the word carries two determinatives representing both axes. Any arbitrary look at the determinative in the dictionary will reveal the kind of movement we are already familiar with – from the iconic to metaphoric or

As the Meroitic writing system is modelled on the Ancient Egyptian and the Meroites were completely familiar with the neighbouring dominant Egyptian culture, it would seem logical that the Meroites were aware of the use of determinatives and ideograms within the Egyptian script and consequently could also have assigned certain signs of their own as not only having a phonographic reference, but also a categorical or ideogrammatical one.

The belief that Meroitic contains no determinatives or ideograms rests on a supposition made by Griffith (1911: 7):

> …but at any rate we can assume that the [Meroitic] demotic alphabet is so small as to exclude the idea of word-signs, diphthongs, determinatives or the like forming a considerable part of it.

Nevertheless, Griffith states in a later publication (1916:113):

> [There are] some other rarer classes of signs, namely (3) purely numerical signs, (4) metrical signs, (5) a few doubtful symbols such as Z in the hieroglyphic texts, and those like an arrowhead and a brush which are found in accounts on ostraca. These last are probably ideographic.

Rilly (2005:276) is in agreement with Griffith as he believes that the Meroites eliminated determinatives and ideograms from the writing system, due to the Egyptian polyvalent system being unsuited to the transcription of another language. However, it is known that the Meroites did use a sign that had no phonographic reference, the mark of division, which in this sense is used as a determinative in indicating a word-boundary.[69]

In her paper analysing the suffixes *s*[70] and *te* Hoffmann (1978:265) suggests that the results on the grammar have not changed since the time of Griffith and she asks whether these suffixes have other translations since the texts cannot be exactly translated. She asserts that there is a need to look at other resources to investigate their meanings. Considering this point, I put forward the possibility that the 'syllable' signs (and perhaps other signs) could also be used as determinatives or ideograms. The following section gives a brief discussion of the Ancient Egyptian hieroglyphic signs borrowed by the Meroite script devisors as it is especially relevant why the Meroites borrowed the signs they did from the plethora of Ancient Egyptian signs.[71]

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metonymic relations. The determinative may have an iconic relationship with the preceding word, or may relate to it in metaphoric or metonymic ways.' Goldwasser (1995:80).

[69] This mark of division takes the form of three dots in the hieroglyphic texts : and two dots in the cursive ⁚. Priese (1973:282-283) believes that the borrowing of this Meroitic sign is more likely to have been from the Ancient Egyptian where he also points out that the plural or collective sign in Ancient Egyptian 𓏥 functions as a determinative signaling the end of a word. Cf. Peust (1999:124), who also agrees on this sign having a determinative function. Rilly (2005:257) states that this sign was utilised to compensate for the loss of determinatives, whereby the writing system notates purely phonetic information.

[70] Hofmann is here using the transliteration method pre Hintze's revision so that this 'genitive' is now transliterated as the 'syllable' sign ⌁ - *se*, for those who follow Hintze's method.

[71] 'The basic writing system of Ancient Egyptian consisted of about five hundred common signs.' Allen (2000: 2).

4.6.2   Meroitic hieroglyph borrowings from Ancient Egyptian

Here it is discussed the Egyptian hieroglyphic signs borrowed by the Meroites for the three 'syllable' signs: 𓈖𓈖 - *ne,* 𓊃𓊃 - *se* and 𓏏 - *te*. This discussion outlines certain points which show that the proposal of polyvalency in the Meroitic script should be investigated further. I discuss the hieroglyphic Meroitic signs rather than the cursive.

(30) 𓈖𓈖 (人) *ne*

Griffith (1911:14) believed that the hieroglyphic sign for *ne* - 𓈖𓈖 was borrowed from the Ancient Egyptian sign 𓈏𓈏 which functioned phonemically as a geminate /n/. This association is drawn from the use of this sign in Egyptian inscriptions of Ethiopian kings as a variant of *n* in spelling Ethiopian names.[72] What is peculiar about this association is that the Egyptian form is the rush sign 𓈏 whereas the Meroitic form uses the sedge 𓇓, which is then doubled. This sedge sign in Egyptian is polyvalent in that it functions as a phonogram *sw* and as an ideogram for both 'king' *nswt* and 'sedge' *swt*. The sedge sign is often used as the abbreviated form of the word 𓇓𓏏𓈖 *nswt* meaning "king". It is plausible that the Meroitic script inventors borrowed the sedge sign from the Ancient Egyptians and retained the initial phoneme /n/ of *nswt* perhaps along with its ideogrammatical meaning. Could this explain why this sign is found in divine epithets such as *nete* (/𐦷𐦠人)[73] and in titles such as *qorene* (人𐦠𐦯//𐦣). What is interesting about the Egyptian hieroglyphic sign 𓇓 is that it refers to the king's divine power as opposed to the form *hm* which refers to the actual individual who holds the divine power (Allen 2000:31).[74]

(31) 𓊃𓊃 (𐦠//) *se*

Griffith saw this sign as being a reduplication of the Egyptian sign 𓊃 (1911:11, 15). In Ancient Egyptian, this sign is polyvalent in being the phonogram *s* and functioning as an ideogram for "door-bolt".[75] Is there a semantic concept encoded in this sign that expresses its use as a possessive that the Meroitic script devisors borrowed?

(32) 𓏏 (/𐦷) *te*

This Meroitic sign is a combination of two Egyptian signs 𓇾 and 𓉐 that Griffith (1911:16) recognised as occurring in 'Egyptian spellings of the older Ethiopian names for *t* + *h*, notably in the name of Taracus.'[76] The Ancient Egyptian sign 𓇾 has polyvalent representations by also being a phonogram for *t3*, an ideogram for "land, earth, world" and a determinative in the words for "estate" and "eternity". The second sign 𓉐 is also used as a phonogram for *h* and as an ideogram for "courtyard".

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[72] Cf. Priese (1973:280, 288), for an alternative proposal.

[73] See Meulenaere (1994) for instances of the Egyptian form *ntr* being written *nt* with loss of *r*. Is it a peculiar coincidence that this Egyptian form means "divine" and we also find the sequence *nete* in Meroitic divine epithets?

[74] Hintze (1962:23, ftn. 1) outlines that when the Egyptian title *nswt-bit* is found in a Meroitic context it is best rendered as "King".

[75] Priese (1973:280, 291) proposes an alternative borrowing for this sign from the Ancient Egyptian see Rilly (2005:270) for a refutation of Priese's proposal.

[76] Cf. Griffith (1911:16) where he indicates another combination that could be related to the Meroitic sign and Priese (1973: 280, 293) puts forward an Egyptian hieroglyphic group that means "land". Rilly (2005:271) agrees with Griffith's association of the Egyptian hieroglyphic with the Meroitic form.

What is remarkable about the Egyptian hieroglyph - ⟨⟩ borrowed by the Meroites is that it has the same consonantal phonographic reference as the Meroitic sign, namely /t/, also its use as an ideogram for the indication of "land, earth, world" which represents a location, and of course being a determinative for "estate" where in Meroitic it is also a locative. Surely, this cannot be a coincidence. How fortunate for the Meroitic script devisors that this Egyptian hieroglyphic sign is so well suited, both phonographically and semantically, for representing their locative morpheme!

The proposal that the Meroitic writing system could be polyvalent calls for a systematic investigation into this area.

4.6.3 Toponyms

In words that are known toponyms the 'syllable' sign /ʕ - *te* is used. Traditionally, this sign is explained as being a locative grammatical morpheme:

(33)   /ʕ ⅄ ⅄⅄ ⅄⅄   *Akinete-lo*   (REM 0247)
       /ʕ ⅄⅄ ⅄ ⅄⅄   *Phrsete-lo*   (REM 0247)
       /ʕ ⅄⅄⅄   *Tmnete-lo*   (REM 0247)

It can be seen in the above forms, in bold, that there are successions of the 'syllable' signs. However, if we take the well-known toponym 'Faras' – ⅄⅄ ⅄ ⅄⅄ *Phrse*, as discussed in §4.1, this toponym is assuredly consonant final, where the ⅄⅄ - *se* sign denotes /s/. It is possible to analyse the form as being:

(34)   /ʕ ⅄⅄ ⅄ ⅄⅄   *Phrse+ te*   "Faras"
                          toponym + locative determinative

In the cases of the toponyms, the proposal that this 'syllable' sign /ʕ - *te* could be a locative determinative is put forward rather than the traditional view that it is a locative morpheme. If this proposal is followed, then the instances where we do find a succession of the 'syllable' signs lead us to suspect that they are not all enunciated, thereby having no phonographic role when they are functioning as semantic category markers (determinatives). The positioning of these signs, word-initially and finally is also indicative of them having a possible semantic function.

Further evidence for this proposal comes from toponyms which have been analysed as having word-final nasal consonants, such as ⅄ ⅄⅄ ⅄⅄ *Akine* "lower Nubia" and ⅄⅄⅄ *Tmne*. There is an assumed orthographic convention in Meroitic whereby a nasal consonant followed by another consonant is not written (§4.4).[77] However, Rilly (2005:371) states that this convention was not systematically respected and gives the form *Akine-te* [akinʈ(ə)] (/ʕ ⅄ ⅄⅄ ⅄⅄) as an example (the word-final nasal 'syllable' sign ⅄ - *ne* is followed by the locative particle /ʕ - *te*), but this nasal omission convention leads us to expect the written form *Akite*. Could it be that in the case of these toponyms, where the nasal is apparently followed by a consonant, it is not that

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[77] Cf. Griffith (1911:22), Hintze (1987:45) and Rilly (2005:367-372, 388). As this omission is seen in loanwords, it could be a possibility that there is a process of truncation in Meroitic where NC > C functions as a loanword repair strategy along with epenthesis, see Rowan (forthc.) for more on this investigation.

this orthographic convention is not respected but that there is no consonant /t/ enunciated following the nasal, as the sign /�- - *te* in these toponyms is functioning as a locative determinative with no enunciation. In other words, the sign /�- - *te* has no phonetic or phonological relevance in these cases and the orthographic convention is therefore not violated.

4.7 Summary of section

This section has provided ample evidence towards the representation of the 'syllable' signs ʋ// - *se* and ⅄ - *ne* being /s/ and /n/ respectively with no inherent *e* vowel. To recap this evidence is: (i) the positioning of the 'syllable' signs at word edges; (ii) equivalent forms showing no vocalisation along with equivalent forms from other languages that show a coronal consonant followed by a front mid-vowel, therefore we should expect Meroitic to transcribe these forms with the 'syllable' signs showing a coronal consonant and a mid-vowel but this is not the case; (iii) the diachronic vowel neutralisation resulting in the 'syllable' signs written and (iv) the assimilation and coalescence of the 'syllable' signs. There clearly exists no comparative data evidencing the 'syllable' signs containing a mid-vowel, but much evidence towards them being plain consonant signs.

The cross-linguistically common phonological process of coronal consonants raising and/or fronting adjacent vowels and that the vowel sign ϛ - *e* is not an underlying phonological vowel are strong evidence explaining why, as Griffith observed, the inherent unmarked 'a' equivalents (3 - *s*, /3 - *n* and ϟ - *t*) are very rarely followed by the separate ϛ - *e* vowel sign. If this linguistic evidence is followed, we can dismiss the analogous assignment of the *e* vowel being inherent in the 'syllable' signs; therefore, these 'syllable' signs should be transcribed as plain consonants (when functioning phonographically).

   If this proposal is accepted, it follows that the Meroitic script devisors represented two sets of phonographic coronal signs; one set that denotes a CV sequence, and the other set that is C only with no vowel i.e. the 'syllable' signs. This representation means that Meroitic can have word-final consonants drawn from the coronal series /s, n, t/. It is evidenced cross-linguistically that languages which contain restrictions on the consonants that can close a word draw them from the coronal class.[78] Moreover, as Yip (1991:61) states 'coronal consonants can occur in positions in syllables where consonants with other places of articulation cannot occur.'[79]

   This section has also called for an investigation into whether there is polyvalence in the Meroitic signs to explain violations in the orthographic conventions and the consecutive use of the 'syllable' signs at the word edge of proper names, titles and divine epithets.[80] I believe, at this stage of my investigation, that there is a valid investigation into the use in Meroitic, like Ancient Egyptian, of using signs polyvalently as determinatives (as semantic category markers) and/or ideograms as these signs are rarely found word-internally but predominantly at word edges.

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[78] E.g. languages such as Finnish can only close a word with the coronal series - /l, t, s, n, d/ (but never /r/) and Ancient Greek has the series - /s, n, r/. Cf. McCarthy (1998) for an analysis of Morpheme Structure Constraints explaining word-final consonant restrictions.

[79] For more on this also see Clements (1988).

[80] Cf. Rilly (2000) for an investigation into these constructions.

Crucially, the claims made in this paper are able to explain the supposed 'peculiarity' of the Meroitic script, namely the inclusion of the 'syllable' signs, that has long been noted, but not understood, by script typologists and Meroitic scholars alike. The implication of these claims is that the ϟ - *e* sign is not a zero-vowel indicator after all, which is where we now turn.

5   Meroitic ϟ - *e* used as the epenthetic vowel

This section recaps the data used for the claims made that the vowel sign ϟ - *e* also functions as a zero-vowel indicator. Empirical phonological evidence is provided which counters these claims but supports the original proposal made by Millet (1973:53) that, when found in equivalent forms, the vowel sign ϟ - *e* is utilised to break up consonant clusters and thus is used as the epenthetic vowel. The main argument, i.e. the analysis of the 'syllable' signs, for the vowel sign ϟ - *e* being a zero-vowel indicator has been challenged in the preceding sections of this paper. Subsequently, this section supports the implications of the conclusion made in §4, namely, the rejection of the analogous assignment of the vowel *e* being inherent within the 'syllable' signs. It follows that a brief discussion is given on the syllable structure differences between Meroitic and the languages where equivalent data is found. This discussion supports the claim of ϟ - *e* used as the epenthetic vowel specifically looking at the phonology of epenthesis as a loanword repair strategy.[81]

5.1 Loanword phonology

This section overviews the repair strategies used in loanword phonology. Kenstowicz (2003: 1) summarises loanword adaptation as:

> The adaptation of a loanword involves the resolution of often conflicting demands to preserve as much information from the source word as possible while still satisfying the constraints that make the lexical item sound like a word of the recipient language.

A major part of the investigation into the phonology of loanword adaptation involves analysing the means by which a language 'repairs' a borrowed word to satisfy violations in its phonotactic and/or syllable structure constraints. The area that specifically interests us here is the strategies used by languages that prohibit consonant clusters when faced with borrowing words from a language where these clusters are encountered.

The two structural solutions available to languages that are essentially CV or CV(C) when encountering consonant clusters in borrowed words are:

(a) Epenthesis
     The insertion of a vowel or vowels to break up consonant clusters.

(b) Deletion
     The deletion of one or more of the consonants within a cluster.

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[81] See Hyman (1970) for a discussion on the phenomenon of borrowing where this has been made to conform to the phonological properties of the interpreting language.

The most favoured structural solution is epenthesis as a minimal repair strategy (Paradis & LaCharité 1997). The following data (Paradis & LaCharité 1997, Charette 1984, Kenstowicz 2003) is taken from a selection of languages that have a CV or CV(C) syllable structure and shows the reparation of consonant clusters in loanwords through epenthesis:[82]

(35)

(a) Fula   French (b) Dida   French (c) Fijian   English
     [kala:s]   ← classe   [pulʊmʊ] ← plume   [wisiki:] ← whiskey
     [darapɔ] ← drapeau   [biki]   ← bik   [doketa:] ← doctor

It is evidenced in (35) that epenthetic vowels can appear in two different positions; these being firstly, the epenthesis site is between a consonant cluster (this epenthesis can either be a reparation of syllable structure or to bar an illegal consonant sequence) and secondly, epenthetic vowels are inserted to syllabify consonants as onsets which would otherwise be in coda position (hence the word-final epenthesis in the data of 31b).

5.2   Schwa – the epenthetic vowel

Further substantiation for the vowel sign ϛ - *e* being an epenthetic vowel and not devised as a zero-vowel indicator comes from phonetic evidence. Perceptually, the peripheral vowels /i/, /u/ and /a/ occupy the furthest corners of the vowel space (fig. 15), whereby maximal contrast is maintained. It is seen in the comparative data (fig. 36-38) that the Meroites do not use /i/, /u/ or /a/ as the epenthetic vowel (or as the schwa vowel) because these peripheral vowels carry information content in that they are grammatically distinct. The vowel ϛ - *e* [ə], as a mid-vowel, has an even distribution in the acoustic pattern and is used as the epenthetic vowel because it is not maximally contrastive in perception (it is also the vowel that is most likely to be affected by surrounding consonants).

   With epenthesis, the vowel position has to be (phonetically) realised in order to retain the Meroitic CV syllable structure, therefore, the vowel ϛ - *e* [ə] is realised because [ə] is the 'neutral' vowel, i.e. the vowel that requires the least perturbation of the tongue body from its neutral 'rest' position.

5.3   Meroitic syllable structure

It is discerned that the syllable structure of Meroitic is CV (Griffith 1911:22) and CV(C).[83] Contributing to this are the claims this paper made in §4, whereby the combination of consonant clusters in Meroitic is disallowed.[84] It is then expected that

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[82] The phonology of these languages is different and so [ə] is not the epenthetic vowel in these cases.

[83] Rilly (2005:405) also states that '*il semble que les structures les plus représentées dans le lexique méroïtique soient CVCV et CVC.*' However, it is unclear how Rilly's claim that the vowel sign ϛ - *e*, doubling as representing a zero-vowel (2005:397), does not contradict his proposal on the syllable structure – see §5.3.2 on Rilly's data showing Meroitic consonant clusters. Is it that the vowel has weakened to zero producing these clusters or is it that the vowel notates a zero-vowel?

[84] It is noted that if there are word-medial consonant clusters in Meroitic they can only share the same place of articulation in being NC sequences; therefore, if it is the case that there is the structure CVC word-internally in Meroitic then the coda consonant must be nasal, see Rowan (forthc.).

when Meroitic encounters consonant clusters in other languages it will repair violations of its own syllable structure through epenthesis. The vowel sign ϟ - *e* is positioned between the consonant cluster to indicate a vowel, albeit a reduced vowel, and not to indicate the absence of a vowel as has been previously thought (Griffith, Hintze, Rilly etc.).

5.3.1   Coptic equivalents with epenthesis in the Meroitic forms

As Griffith (1916) first proposed that the vowel sign ϟ - *e* indicated the absence of a vowel through his analysis of Coptic equivalents, this section discusses and compares the data Griffith used to make this claim through contrasting Coptic syllable structure with Meroitic and shows that the use of the vowel sign ϟ - *e* is epenthetic and does not indicate a zero-vowel.

Griffith's (1916:119-120) data from §3 are presented here again:

(36a)   Coptic   Pakhôm   (b)   Coptic   (P-)Bêk
        Meroitic   Ph⁄m ϟ   Meroitic   B ϟ k ϟ
        Translit.   *phome*   Translit.   *beke*

Griffith observed that the Coptic forms are consonant final; however, in the Meroitic equivalents the vowel sign ϟ - *e* is written word-finally. Griffith therefore assumed from this that the Meroitic vowel sign indicated the absence of a vowel (zero-vowel). This paper has made the claim that Meroitic words can be CV(C) but only the consonants /s, n, t/ can be found in a word-final coda position. It is seen in the data of (36) that these consonants are not found in the Coptic forms and therefore we expect the syllable structure CV in Meroitic. Epenthesis is the repair strategy used by the Meroites, and so ϟ - *e* is written to indicate an epenthetic vowel and not a zero-vowel.[85] These two forms should therefore be realised with an epenthetic schwa [ə] word-finally.

   In a work on Egyptian Phonology, Peust (1999:183) states that 'Consonant clusters are common in Coptic.'[86] Given this, we therefore expect Meroitic to break up these consonant clusters whenever they are encountered through the process of epenthesis:
(37)   Coptic   *shapshi ~ shepshe*
        Meroitic   *sipesi(ye)*   (ϟ ⫽) ⅄3ϟ⧸⅄3
        (Greek)   Σεψις

In the data of (37) it can be seen that the word-internal consonant cluster '*psh*' /pʃ/ of the Coptic form has been broken up with the epenthetic vowel sign ϟ - *e* of the Meroitic equivalent as this retains the CV sequence of the Meroitic syllable structure.[87] This gives the phonetic transcription [sipəsi] and not *[sipsi].

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[85] Rilly (2005:397-398) also makes this claim for this data, '*les noms méroïtiques empruntés à l'égyptien Bek*e *et Ph*ome *sont très probablement terminés par un schwa.*'
[86] See also Hintze (1980), Kasser (1991) and Loprieno (1995).
[87] The consonant cluster in the Greek form /ps/ is written with the digraph psi 'ψ' /ps/, the phoneme /ʃ/ is not part of the Greek phonological inventory see Newton (1972:13); Somerstein (1973: 3); Allen (1968:43) for more on Greek phonology.

5.3.2   Greek equivalents with epenthesis in the Meroitic forms

Rilly (2005), follows the claim made by Griffith that the vowel sign ς - *e* doubles as indicating the absence of a vowel. Presented in fig. 34 & 35 is the data Rilly (2005:397) puts forward which he believes shows the notation of a zero-vowel (in bold).[88] This data is mainly drawn from Greek equivalents:

(38) Meroitic   Greek
  (a) *bertoye*   Ἀβρατοεις
  (b) *peseto*   ψεντης
  (c) *pedeme*   Πριμις
  (d) *qoreti*   Κορτη
  (e) *p̱rse*   Παχωρας

As is shown (38), Greek exhibits consonant clusters. Consequently, I claim that these clusters, when encountered in Meroitic, will violate Meroitic syllable structure and so Meroitic repairs these violations through epenthesis. The form of (38b) (as already discussed in §4.3.2) shows the epenthetic vowel *e* between the /ps/ sequence. Greek phonotactics allows the cluster /ps/ as is evidenced with its notation with the unique digraph 'psi'.[89]

  The forms of (38b) *peseto*[90] and (38e) *p̱rse* are now compared, as I believe this highlights a distinct problem associated with the ambiguous assignation of the vowel sign ς - *e* representing a vowel and a zero-vowel. Both these forms are written with the 'syllable' sign *se* (in bold in the preceding forms). However, in (38b) (under Rilly's analysis) the vowel of the 'syllable' sign is vocalised whereas in (38e) it denotes a zero-vowel.[91] Most of the equivalent data transcribes proper names from other languages. If the Meroitic vowel sign ς - *e* does indeed indicate a vowel and a zero-vowel then this ambiguity would have caused as much confusion for the Meroitic speakers as to the correct vocalisation of the majority of non-native words, as it does for Meroitic scholars who follow this system today.

  Two other equivalent forms need further qualification. The data (39) shows two Meroitic forms that are written with the 'syllable' signs (in bold):

(39) Meroitic orthographic   Transliteration   Greek
  (a) ⤧⧫⤧⧫⧸⤙   ***T*ebiki**   Τβηχις
  (b) ⤧⧫⧫⧫⧸⧸   *semeti*   Σμιθις

This paper has claimed that these 'syllable' signs (when functioning phonographically) notate a consonant that is not followed by a vowel, although this proposal now leaves us with an apparent contradiction as this section has claimed that consonant clusters which violate the syllable structure of Meroitic, are repaired through epenthesis. However, in the instances of (39a & b) it seems that some clusters are allowed (because I have argued that there is no vowel in the 'syllable' signs) and

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[88] See f.n 83.

[89] The Classical Armenian language allows the cluster /ps/ as in /psak/ but compare this with the New Julfa dialect where epenthesis occurs - /pəsak/ "crown" (Vaux 1998:499).

[90] See f.n. 58.

[91] Rilly (p.c) follows the theory that the 'syllable' signs contain a vowel that doubles as a zero-vowel when found in most word-final positions.

no epenthesis is seen (or is not notated by the true epenthetic vowel – the distinct vowel sign ς - *e*).

What we find (39) are *orthographic* consonant clusters (transcribing non-Meroitic words). In (39a) the Greek equivalent form is given in Rilly's (2005:397) data showing the indication of a zero-vowel, although I believe the analysis should come from the original Egyptian equivalent *t3 b(j)k(.t)* "the female falcon" (2005:364), where the consonant cluster straddles a word-boundary, namely the article and its noun. It is more likely that the Egyptian equivalent was borrowed directly to Meroitic rather than from Egyptian through to Greek and then to Meroitic. It has already been discussed that the vowel is lost in the Egyptian article.[92] The Meroites have the capability to transcribe this form with the 'syllable' sign /⊢ - *te* (which I claim is phonemically a plain consonant /t/) positioned word-initially, because through this the Meroites can notate the Egyptian form to its closest representation. However, I claim that there is no violation of Meroitic syllable structure as on the surface (phonetic) level these forms will be pronounced with a schwa vowel.[93]

I term this vowel as an excrescent vowel[94] (Levin 1987, Davidson & Stone 2003) in order to distinguish it from the epenthetic vowel that is notated with the vowel sign ς - *e*.[95]

(40) Meroitic orthographic   Transliteration   Phonetic level
  (a) �   *Tebiki*   [t³biki]
  (b) ⋯   *semeti*   [s³məti]

What this data (40) highlights is that again distinct levels have to be discerned in any analysis of the Meroitic script: orthographic, phonological and phonetic.[96] The assumption that there is a direct relationship between the orthographic and phonetic levels of the script is erroneous and this is evidenced in the problems associated with the long-held ambiguous transliterations/transcriptions of the 'syllable' signs and the vowel sign ς - *e*.

5.4   Consonantal compatibility restrictions in Meroitic

In this section, I would like to advance an alternative analysis of Rilly's (1999b) important study, where he supports the theory that the vowel sign ς - *e* is a zero-

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[92] Fig. (2a) and (2b) show other Egyptian forms with the definite article transcribed by the Meroites with the 'syllable' sign /⊢ - *te*. See also §4.1.

[93] Kenstowicz & Suchato (2004: 2) outline that the loanword adaptation process 'can take into account a variety of factors to achieve the best match to the source word including phonetics as well as orthography.'

[94] A transition vowel that blocks the violation of the Meroitic syllable (CV).

[95] The difference between excrescent and epenthetic vowels is not phonetic, as they are both realised at surface form, but at the level of the script where the epenthetic vowel is notated whereas the excrescent vowel is not.

[96] §4.4 has already discussed that in nasal + stop sequences the nasal segment in not written. This contributes to the claim that there is not always a direct relationship between the orthographic and phonetic levels. Also, see Depuydt's (1994) discussion on the principle that the Egyptian script should be studied as distinct from but yet in conjunction with the language that it represents.

vowel indicator with a combinatorial analysis.[97] The analysis presented here proposes that there is a strong possibility of consonantal compatibility restrictions in Meroitic.

Rilly (1999b), in this study, draws upon a corpus of Meroitic texts on which he conducted a combinatorial analysis, stated that sequences of $C_\alpha e C_\alpha$, where the consonants α = labials or α = velars, are never found.[98] Rilly puts this absence down to haplography in the Meroitic script, as it is believed that the language has a very high assimilation tendency,[99] and this is due to the vowel sign ς - *e* being rarely pronounced as *'l'absence de voyelle entre deux consonnes est notée par un signe translittéré e* [ς]' (1999b:104). Thus, when ς - *e* notates a zero-vowel, the two consonants that share a labial or velar place of articulation will be adjacent and therefore assimilate, hence the absence of these written sequences in the texts.

However, I conducted a preliminary examination of Meroitic texts that revealed that not only are the sequences $C_\alpha e C_\alpha$ not found but also that the combinations $C_\alpha a C_\alpha$, $C_\alpha i C_\alpha$ and $C_\alpha o C_\alpha$ are very rarely evidenced (where α = labial or α = velar consonants).[100] Primarily, this examination leads me to claim that the absence of the identical place sequences of consonants is not due to an assimilation process ($C_\alpha e C_\alpha$ because *e* is a zero-vowel in these instances) but is due to consonantal compatibility restrictions.

Consonantal compatibility restrictions are well attested in Semitic languages (Greenberg 1950; Bender & Fulass 1978; McCarthy 1986, 1994b; Hayward & Hayward 1989) and in the wider Afro-asiatic language family (Bender 1978).[101]

The restriction that takes place in Semitic languages is generally that within a lexical root two consonants that share the same place of articulation (homorganic) cannot co-occur.[102]

What we find in Meroitic is that the sequences (41) are very rarely attested. This is not a complete list of sequences, but a representative sample of the co-occurrence restrictions found. This data shows that two labial consonants or velar consonants cannot co-occur in the same form:[103]

(41) *bap*, *bip*, *bop*, *map*, *mip*, *mop*, *h̠ah̠*, *h̠ih̠*[104]

Consonantal compatibility restrictions are also evidenced in Ancient Egyptian - a member of the Afro-asiatic language family.[105] Even though, cross-linguistically, this constraint on consonant place occurrence can be found in languages outside of the

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[97] Rilly uses texts from the archaic period through to the late period and therefore through this shows that the omission of these sequences is not due to diachronic vowel weakening.

[98] '*Une étude faite sur le "lexique" cité montre que les séquences graphiques* *bep, *bem, *meb, *mep, *peb, *pem *ne sont jamais représentées*' Rilly (1999b:105).

[99] As observed by Hintze (1979:65-67).

[100] I have drawn upon a collection of texts that include the longest known Meroitic inscriptions i.e. REM 1044, 1003, 1182, 1183, 0094.

[101] These restrictions have also been evidenced in languages outside of the Afro-asiatic family cf. MacKay (1970) and Yip (1989).

[102] See Greenberg (1950) for more on this in Semitic languages where his observation is based on consonantal roots and not on derived forms. It is pointed out also that restrictions on identical consonants co-occurring take place on the first and second radical of a triliteral root, but that, in instances found when two identical consonants do co-occur this is usually due to reduplication of the root.

[103] This area is discussed in more detail in Rowan (forthc.), however, it could be that there is a gradient co-occurrence restriction in Meroitic.

[104] The two signs transliterated as *h̠* and *h̠*, are generally taken as having a velar place of articulation.

[105] Cf. Greenberg (1950:179-181), Peust (1999:194-198) and Reintges (1994).

Afro-asiatic language family (cf. f.n. 101), the question has to be addressed as to what this phenomenon means for the inclusion of Meroitic within the Nilo-Saharan language family. The proximity of Afro-asiatic languages, where co-occurrence restrictions are vastly represented in the phonology, to Meroitic is significant; and from this therefore, I put it forward that the membership of Meroitic within the Afro-asiatic family should not be completely discounted.

6   Conclusion

This paper has investigated the traditional representation of the 'syllable' signs ⼽// - *se* and 𐦠 - *ne* from a phonological analysis, whereby the conclusions made have impacted also on the traditional representation of the vowel sign 𐦰 - *e*. The following summarises the conclusions made:

- ⼽// - *se* = /s/ and 𐦠 - *ne* = /n/.
- The Meroitic coronals /s, n, t/ raise the following vowel.
- [e] is the surface form of /a/ after the coronals /s, n, t/.
- The 'syllable' signs indicate a consonant-final word when functioning phonographically.
- 𐦰 - *e* is not a phonological vowel but a phonetic vowel - [ə].
- 𐦰 - *e* [ə] was not devised as a zero-vowel indicator.
- 𐦰 - *e* [ə] is used as the epenthetic vowel.
- Distinct levels, orthographic, phonological and phonetic, have to be discerned.
- Signs could be being used polyvalently.
- Consonantal compatibility restrictions are evidenced in Meroitic.

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