Towards an understanding of Meroitic phonology* Kirsty Rowan 110064@soas.ac.uk

n Introduction

This paper seeks to address certain aspects of Meroitic phonology, primarily the seemingly random omission of the nasal syllable sign. The Meroitic script exhibits considerable variability in the spellings of the same words, apart from the irregularity of vowel placement, this variability is most apparent in the seemingly random omission of word final coronal consonant graphemes when postpositions, determiners and adjectives are suffixed to the stem nouns where the initial consonants of these suffixes are lateral coronal. These inconsistencies pose serious problems, not only to a standard transliteration of words but also towards any insight into the pronunciation of the Meroitic language. The ability to discern dialectal variation, diachronic change, morphophonemic alternation or simply orthographic errors from each other is wrought with difficulties for any analysis of the Meroitic script. In light of these irregularities, this paper seeks to investigate whether phonological theory in particular a Government Phonology (henceforth GP) analysis is able to propose a working hypothesis of Meroitic phonology, namely (i) the vocalisation of the schwa graphemes and (ii) the assimilation process of nasals and liquids and its exceptions. It is hoped that this study can go towards enhancing the understanding of the Meroite's language.

This paper is organised as follows: §0 presents the background to the script and its grapheme to phoneme correspondence along with an overview of the system of writing and the methods of transliteration and transcription. §1 briefly discusses the typology of the script and the Universalist's approach to script typology. §2 gives an overview of the Meroitic vowels and vowel space taking into consideration universals of vowel inventories. §3 investigates the vowels within GP's elements representation with §4 analysing the constituent structure of Meroitic. The nasal omission is investigated in §5 with a discussion on the failure of Lexical Phonology when applied to Meroitic. A GP analysis is given in §6 of final empty nuclei and its implications in Meroitic with a proposal on the morpho-phonological interface, finally, §7 concludes the paper.

0.1 Historical background

The Kingdom of Kush 900BC – 320AD, was one of the most important early civilisations of sub-Saharan Africa. The civilisation, also known as the Kingdom of Napata and Meroe, stretched from the third cataract to the sixth in present day Sudan. The Kushites used a script² consisting of 23 distinct graphs for writing their language. The Meroitic script has two forms – (i) a hieroglyphic (monumental) form with characters borrowed from the Ancient Egyptian inventory and (ii) a cursive³ (handwritten) form similar to Ancient Egyptian Demotic. The hieroglyphic form was used monumentally carved onto temples and in usage is less common compared to the

^{*} I would like to thank Monik Charette and Alex Bellem for their insightful comments and advice.

It is observed that other phonemes trigger another assimilation process inherent within the Meroitic script such as Hesterman's Sound Law (Folia Ethnoglossica 1925) where $s \to t/_{\#}$.

² The script of the Kushites is termed Meroitic.

³ Cursive is an erroneous term for the handwritten form as the signs (bar one) are not ligatured to one another, but as this is the traditional term it is adhered to.

script also runs them were glyphic characters face the opposite direction from AE. Even though the dominant influence on the kingdom and on its script was AE, the language does not seem to be derived script also runs right to left, as does Ancient Egyptian (AE) but the hieroglyphic if the Meroites were not as competent in the hieroglyphic form. The direction of the familiar with using the control of the familiar with using the familiar with using the familiar with using as confidence as familiar with using as commetent in the hieroglyphic form. The directions as monuments. A very more more familiar with using the cursive form of the script than the hieroglyphs as Griffith monuments. From archaeological evidence it seems as if the Meroites were more more than the hieroglyphe and more more than the hieroglyphe archaeological evidence it seems as if the Meroites were more cursive script. The cursive form is found written on stelae, ostraca, temples and

have worked for many years on Meroitic to find a cognate language that would verify the language of the Meroites, but so far very little progress has been made. and grammatical items, the language as a whole remains unknown. Various scholars of the graphemes by using a textual analysis, however, apart from a handful of lexical The Egyptologist scholar Griffith (1911) brilliantly established the phonemic values

which have been accepted and followed within the field of Meroitic studies. (1971) have proposed revisions for the phonemic values for a few of the graphemes Since Griffith's initial assignment of phonemic values Macadam (1950) and Hintze 0.2 Meroitic grapheme to phoneme correspondence⁸
An example of the Meroitic cursive script with its transliteration values is given in (1).

	7.	14	UII	>	w	1 3	n	.5	^	8	Initial a /
word divider	10	To.	Se	n°	S	<u>h</u>	h	1	P	, ,	4

transliteration and this can cause confusion when analysing the script. Apart from the It should be pointed out that the phonemic values are not the same as the method of

approximation of their phonemic values. following graphemes, all other transfiterations, at present, are thought to have a close

- 0 'a' can stand for any of the vowels in the Meroitic inventory scholars transliterate it as 'a' but they have followed that the transliteration of initial a This grapheme is only found word initially and so Meroitic
- = back vowel $/\omega/$ for this grapheme. This disparateness is possibly due to Hintze's uncertain exact positioning of this vowel. Section 2.2 investigates this vowel placement. grapheme was better transliterated as 'o'. He proposed that this grapheme denotes /o/ or /u/ but when giving the vowel inventory he only posits the high Hintze (1971:322) believed that for ease of presentation this
- E alveolar retroflex. voiced alveolar stop. Hintze (1971) proposes that it is more likely to be an Macadam (1950) revised its equivalence as being phonemically nearer to a d Originally Griffith believed this grapheme to represent 'z' but
- 3 (velar or pharyngeal) with Hintze proposing that < h could be a velar nasal. phonemic assignment is unstable as they are thought to be either fricatives < h and 3 \underline{h} These graphemes show the standard transliteration but the

Syllable graphemes

The syllable graphemes phonemic correspondences were attributed because:

- a) ne this grapheme is never followed by a vowel.
- = is only followed by the vowels /a/, /i/ and /u/ but never /e/
- this grapheme is never followed by a vowel.
- <u>5</u> UII is only followed by the vowels /a/, /i/ and /u/ but never /e/.
- 4 this grapheme is never followed by a vowel

c

- t" this grapheme is never followed by a vowel.
- t is only ever followed by the vowels /a/ or /i/

use are important for the analysis in §4. denote vowel or the absence of a vowel (except - t0). The implications for their This means that these 'special' syllable signs 11 are used for this class of coronals to

^{*} Slabs of rock or granite.

cognate analysis, Meroitic does not seem to belong to the same language family as AE (Griffith 1911).

For discussions on the state of research on Meroitic see Hintze (1989), Török (1997). Ancient Egyptian is a Semitic language belonging to the Afro-Asiatic family. What is known of the Meroinc language is that it is agglutinative and lacks gender from this and through lexico-grammatical

The investigation into a revision of the phonemic correspondences is forthcoming.

the late period cursive fonts. Academie des Inscriptions et Belles-Lettres for the use of the fonts. For consistency, in this paper I use My thanks are due to Claude Carrier and Claude Rilly of the Group d'Etudes Meroitiques de Paris,

¹⁰ The sign for 'initial a' I argue elsewhere (forthcoming) that in actual fact is more likely to be a

vowel. 11 The analysis of consonant and so is not relevant to this point. t" at this time is not included because the change on the quality of the

The system of Meroitic writing

0.4 The system of writing, even hough it looks as though it is using the based upon a syllable type system (signs representing consonant plus vowel). The principles of an alphabetic script (distinct signs for consonants and vowels), is in fact grapheme represents a consonant and an inherent unmarked vowel (CV sequence) a Meroitic script show an inherently syllabic structure where each consonantal proposals put forward by Griffith and expanded by Hintze for the understanding of the of a distinct vowel grapheme. The unmarked vowel was assigned as /a/ as Griffith change of vowel following the consonant grapheme is represented by the positioning followed each other without a consonant between' (1911:22). Hintze (1971:322) by the Greek transcriptions.....but there is no evidence that two vowels sounds syllables commencing with a consonant. There were also closed syllables, as is shown stated further on that 'the writing indicates that the words consisted mainly of open He justified this because of the spellings of certain places such as 'Napata'. Griffith transcribed Meroitic names with the vowel a, where no vowel is marked in the script etc.' Hintze also concluded that geminate consonants could not be represented in the written without a vowel sign, signifies Consonant + Vowel /a/. Hence t is /ta/, b is /ba/ revised the work done by Griffith and summarised that 'every consonant, which is could be /li/ and /li/. The indication of long vowels and diphthongs is also not therefore if geminates are present in the language there is no indication of them as 'li' script as two identical consonants together 'II' would have the transcription /lala/ represented in the script and so it has followed that no proposals have been language does contain them. forthcoming for evidence in the language of these, although, it is possible that the

Meroitic transliteration and transcription

of representing the Meroitic data in the following way: As the system of transliteration can cause confusion, this paper will follow the system

Meroitic examples are given in the Meroitic script:

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The traditional method of transliteration is given in italics:

kdi

The phonemic transcription of Meroitic is given in slanted brackets: /kadi/

the vowel in superscript: The phonemic transcription of the four syllable graphemes is indicated with

though the writing system is read in the opposite direction) this is for ease of presentation. The traditional transliteration shows that the inherent unmarked /a/ all instances of the /e/ grapheme will be represented in their closer form of schwa /a/, vowel is not given. This unmarked /a/ is indicated in the phonemic transcription and The Meroitic examples in this paper are transposed to read from left to right (even and the transcription of the 'o' grapheme is represented by /u/.

1 Meroitic script typology

Meroitic deviates from Daniels' model but is not alone in its organisation as it is similar in structure to Old Persian Cuneiform. ¹³ Griffith's and Hintze's proposals, could be classified as a syllabic script of the seemingly confusing four graphemes that represent syllables. Meroitic, under vowels but actually includes a separate grapheme for the vowels, in this sense signs with an unmarked a it does not modify the consonant signs to denote the other Daniels' neosyllabaries, but even though Meroitic seems to encode the consonant systematic fashion to denote the other vowels or absence of vowels usually through consonant plus a to each basic symbol but one in which the symbol is modified in a 'neosyllabary' type. Daniels (1992) uses this term to designate scripts that assign a the use of diacritics. The Ethiopian and Devangari scripts are primary examples of The script is often erroneously termed alphabetic12 even though it also notates the

The Universalist approach to script typology

tendencies that govern how writing systems represent their languages. 15 Justeson divided these scripts into two distinct, but crude categories, a summary of his criteria empirical analysis where Justeson published a study on fifty language/script pairs constraints. The typological-universalist approach was conducted through an that as languages themselves writing systems are also subject to universal linguistic This work aimed to establish a number of universal regularities and (1976) incorporated the study of writing into the Universalist theory of language¹⁴ This section briefly summarises a study conducted into script typology. Justeson statistical

- A script is classified as syllabic if and only if many signs represent multiphonemic units, at least one phoneme in each unit being a syllabic nucleus
- A script is classified as alphabetic if single signs only represent consonants nucleus then and is regularly used with a single meaning only or only vowels. Also if a diacritic is used in differentiating the syllabic

as syllabic. The three other vowel graphemes (i, u, a) can be seen as a deviation or with the /a/ being the syllabic nucleus and accordingly the script should be classified all contain an unmarked /a/ vowel (3 m-/ma/) thereby representing a CV sequence is understood this classification has to be revised. The Meroitic consonant graphemes could classify the script as alphabetic. However, once the system of Meroitic writing On the surface, Meroitic exhibits distinct graphemes for vowels and consonants that exception to the syllable based principle of the script as they are not of a CV sequence

syllabic system'. Shinnie (1967) refers to the script as alphabetic. Jensen (1970;79) believes the two forms of script are 'pure alphabetical scripts (apart from two syllable-signs).' The mistaken forms of script are 'pure alphabetic is seen in the literature that predates Hintze's accepted classification of Meroitic as alphabetic is seen in the literature that predates Hintze's accepted reanalysis of the principles of the Meroitic script. For more work on the typology of scripts see Bright (2000), Gelb (1963), DeFrancis (1989), Coulmas (1989, 2003), Sampson (1985), Daniels & Bright (2000), Gelb (1963). ¹² Davies (1990:133) states that 'although it [Meroitic script] looks alphabetic, Meroitic is in fact a

³ See Jensen (1970:106-114).

¹⁴ See Greenberg (1963, 1966a, 1966b 1975).

⁽¹⁹⁶²⁾ on the importance of synchronic universals in validating reconstructed phonological systems. See Justeson & Stephens (1978) on the reconstruction of Minoan phonology using language universals. This theory has wider implications when used for reconstructing 'dead' languages, See Jakobson

but only V. However, as they always follow a consonant grapheme¹⁶ (and thereby change the quality of the unmarked /a/ to their own specification) they keep the CV Meroitic and which Justeson positions in the syllabic category. type sequence and hence syllable. Furthermore, Old Persian Cunciform being one of the sample scripts in the study also follows the same organisation principles as

Meroitic complies with the unrestricted universals that were without exception in Meroitic within the Universalist approach to script typology

Justeson's sample study:

- distinguishing some consonantal phonemes. All writing systems distinguishing any phonemes contain signs
- Ξ No writing system represents either long or geminate consonants.
- (E) Few writing systems distinguish all their phonemes
- Most writing systems over-represent some of their phonemes

geminate consonants (ii), it has to be debated whether the Meroitic graphemes do discouraged less in scripts with few signs than in those with many' (1976:61). types of scripts. As Justeson points out 'over-representation is presumably vowel and a syllable sign. The over-representation of phonemes is seen in certain phonemes (/n/, /s/ & /t/) by utilising a consonantal sign with an inherent unmarked cover the full phonemic inventory (iii) and Merottic over-represents some of its Merotic contains consonantal phonemes as in (i), it does not represent long

language that underlies the script. may elicit a deeper understanding of the organisational principles of the Merottic any language' (Justeson 1976: 78). Further investigations into this line of research corresponds directly to a constraint on the representation of phonemes in scripts in found that overall 'a constraint on co-occurrence of phonemes in speech also correspondence between universals in speech and linguistic universals of writing. He Justeson's study largely substantiates his main premise that there is a direct

Meroitic vowels

The vowel inventory of Meroitic as initially proposed by Griffith (1911) and revised by Hintze (1971, 1974)¹⁷ exhibits a four-vowel system:

2 Unmarked a - not transliterated

Meroitic a as a vowel and a no vowel indicator

A very important part of understanding the functioning of the script is the ambiguity of the schwa sign (a). The Meroitic script was seen initially by Griffith (1911) to

vowels between the two, since its omission would have involved the tacit expression of a stronger vowel. 19 Egyptian names of the type that the Meroitic script (and presumably their language) names and words. This is, he believes, because 'when a consonant cluster occurred in (1974:6) tends to limit this practice to the Meroitic inscriptions of Egyptian persona there is no surface indication of when the vowel is realised or when it is not. Millet convention has further complicated proposals into the vocalisation of Meroitic, as grapheme has the ambiguous task of indicating a vowel or no vowel.18 This denote the omission of a vowel following a consonant by the grapheme 9 e /a/.

/t/ but /sa/ + /l/ remains unchanged an intervening vowel. Therefore, the vowel e /ə/ on the syllable sign would in this in $/U^{21}$ This is only possible if /s/ and /l/ are adjacent (in immediate contact) without script is that of Hestermann's Sound Law²⁰ where the combination of /s/ + /l/ results analysis of phonemic transformation. An often occurring phenomenon in the Meroitic consonant clusters of foreign words. Strong evidence for his proposal comes from the writing 9 e /ə/ for a vowel or no vowel was not restricted to the transcription of However, Hintze (1971) gives a stronger argument in support of this grapheme's ambiguity as part of the Meroitic system of writing as he believes that the custom of transcribed as se that is adjacent to the liquid N. Therefore, this is always $/s^2/+N^2$ context denote no vowel. When this occurrence is found it is the syllable sign

The Meroitic vowel space

Hintze (1974:74) revised the Meroitic vowel inventory and described it by utilising the SPE²² rectangular vowel system, and gives the following forms:

opposed for the front-back dimension (as in fig. 3b above). Hintze's inventory in fig greater than the opposition between low vowels on the front-back dimension. This (Crothers 1978, Maddieson 1984) show that the opposition between high vowels is are better characterised as triangular. Studies of the typology of phonological systems using the tridirectional vowel dimension: 3a is closer to the triangular vowel space dimension and is expanded upon in fig. leads to the typologically marked category of languages that have two low vowels This paper proposes a revision to Hintze's vowel inventory in that vowel inventories

preceded by a consonant grapheme. Griffith (1911) proposed that in early writings these graphemes 16 In earlier texts it is found that the vowel signs \$ /a/ and \$\mu\$ fi/ can stand word initial without being

could have also had a consonantal value. ¹⁷ As pointed out in section 0.2 (ii) in his vowel inventory Hintze gives only the high back vowel lu^l

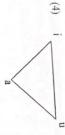
¹⁸ The indication of this grapheme's ambiguity comes from Egyptian loanwords where it is known a yowel is not present but where the Meroites position /a/ cf. Griffith (1911)

inherent unmarked /a/, to change the vowel quality the graphemes representing the other three vowels of their inventory follow the consonant. Therefore, Millet believes the stronger vowel is the unmarked 19 This point refers directly to the system of the Meroitic script in that each consonant sign has an

²⁰ Folia Ethnoglossica 1925-26

²¹ This process is apparent with the suffixation of certain grammatical morphemes onto an item

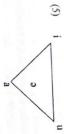
²² Chomsky & Halle (1968).



and van der Hulst (2001) in that /i/, /u/ and /a/ are 'perceptually maximally distinct.' frequently obey the principle of maximal perceptual differentiation as stated by Ewen also have a frequency hierarchy of the pattern a > i > u. Typologically, vowel patterns as the first vowels that children acquire. Greenberg (1966) showed that these vowels articulatory and as such are phonologically basic. The peripheral vowels are also seen corner, peripheral or 'quantal' (Stevens 1972) - the vowels that are particularly languages that only have a three-vowel system. They are variously described as being frequency than any other vowel. These are also the vowels that can be predicted for 'stable' acoustically. These vowels are maximally distinct both acoustically and that all languages contain the vowels /i/, /a/ and /u/ and they also occur with greater Further support for the proposal of using the tridirectional vowel space dimension is

The positioning of schwa

mid-central placement in (5): This paper positions the schwa vowel (represented in the Mcroitic script as - 5) at a



space used to its full availability in consideration of the above points. bunched up into certain areas with other parts of the space being left empty. The evenly in the available phonetic space - the vowel space is used so that vowels are not research on vowel typology it is ascertained that vowel phonemes tend to pattern assumed. However, in light of the investigations into universals of vowel systems and this vowel and as such a definite placement (of this Meroitic vowel) cannot be well-defined acoustic properties than the corner or peripheral vowels. This paper uses openness, backness and roundness. It is evident that central or mid vowels have less of the available interior space and so can exhibit a range of phonetic qualities from fl_{\star}/u' and fi' or /a'. The fourth (schwa) vowel shows variation on positioning because placement of the schwa as mid-central in this paper shows the available interior vowel the common symbol for the schwa - /ə/ as this symbol represents the neutral quality of Crothers (1978:116) asserts that all languages that have four or more vowels have /a/,

Government Phonology elements theory

three melodic primes or elements [I], [U] and [A].²³ The combination (or fusion) of with the discussion given in §2. This theory is able to capture the internal as being of a 'tridirectional' (Ewen & van der Hulst, 2001) dimension, in compliance representation of vocalic expressions by the certain combination or isolation of the Within GP element theory (KLV 1985, 1990; Harris, 1990) the vowel space is defined

parametric conflation of the [I] and [U] tiers: English where we do not find front round vowels. This is encapsulated by the world's languages to be captured. An example of which is the vowel system for reside on their own autosegmental tier and allow the vowel systems found in the [A] gives the independent interpretation of the vowel a. These melodic primes each the element [A] with the element [I] results in the vowel e, the isolation of the element

6

expression. The governing relationship attributes headship (or status of governor) to one of the elements, and if a combination of elements is expressed, the role of operator or dependents to the governed elements.²⁴ explained by the incorporation into the theory of an asymmetrical relationship (that is language specific) between the elements that make up the vocalic The distinction between tense and lax vowels in English such as i/1, u/0 etc. governing

3.1 Element representation of the Meroitic vowels

in accordance with three-vowel system found in languages such as Classical Arabic. the [I], [A] and [U] tiers prohibiting the fusion of all three elements. This conflation is The Merottic vowel system can be accounted for through the parametric conflation of

expressions: Therefore, the Meroitic vowel system is defined in element terms as simples

(8) Unmarked
$$a$$
 – not transliterated /a/ [A]
 $\frac{1}{i}$ /i/ [I]
 $\frac{1}{i}$ $\frac{1}{i}$ /u/ [U]

and Ewen, 1987). realisation of the empty element []. Finally, this leaves the schwa vowel \$ e /ə/ represented in element terms as the 'cold' [v] (Kaye et al. 1985), 'neutral' [@] (Harris, 1994) and 'centrality' (Anderson This vowel has variously been described as

accounted for by the combination of one of the elements [I], [A] or [U] with the non-labial. Languages differ with regard to the phonetic property of the schwa vowel In element theory the empty element covers the area that is non-palatal, non-open and The specification for the varying placement of schwa in the world's languages can be

^{23 [1]} defines palatality, [U] labiality and [A] openness

licensing constraints on vowels in Turkic languages. See Harris (1990) for more on head/dependent asymmetry. See Charette & Goksel (1998) for

element representation in (9): empty element is supported. This gives the vowel inventory of Meroitic with their vower space. The remaining the combination of the elements in association with the central placement and as such no combination of the elements in association with the vowel space. The positioning for the Meroitic schwa in this paper is kept to the midempty element to describe the varying position this vowel can take in the available

8	\ \	Un
e	0	$ \frac{\text{marked } a - \text{not translite} \text{rated}}{i} $
/e/	/u/	/2/
	Ξ	ΞΞ

upon through the analysis of the constituent structure in section 4 onwards. repercussions on the vocalisation of the language and its implementation is expanded the schwa as the realisation of an unlicensed empty nucleus. This assignation has It can now be proposed that the Meroitic vowels /a/, /i/ and /u/ are lexical vowels with

Meroitic vowel-zero observation

implementation as a vowel-zero indicator is that throughout languages that show syncope/epenthesis phenomena mostly do so with a schwa vowel. ²⁵ What is striking about this usage of the apparent schwa grapheme and its represents the schwa vowel /a/ and which also stands for the absence of a vowel As discussed in §2.3 the Meroitic script uses the grapheme 9 transliterated as e that

Government Phonology

of a derivation are prohibited (as in Lexical Phonology). Kaye states that 'derivations satisfied, which stipulates that phonological processes which apply at different stages system of language-specific facts. GP is primarily concerned with representations and Government Phonology (KLV 1985, 1990, Charette 1990) is based upon the notion of principles and parameters where principles are inviolable and parameters express a assigned into their constituent structures where the phonological information is are assumed to be 'blind' in the sense that no process is aware of the history not the follows the tenet that processes apply whenever the conditions that trigger them are relations between constituents are strictly local and strictly directional thereby nuclei. Each nucleus is dominated by a rhyme. These constituents may or may not governing and licensing relations that build into the constituent structure of onsets and positioned on a skeletal tier that consists of timing slots. The skeletal tier is assigned branch depending upon the parameter setting for a given language. The governing derivation in which it is involved' (1995:290). Representations are

'we lie'

is optional schwa epenthesis in the following forms: Whereas Dutch uses the mid central schwa [a] in vowel-zero alternations. One instance of this process

[help] ~ [helap] 'help' [balk] ~ [balak] 'beam'

See Charette (1990) for an in-depth analysis of vowel-zero alternation and its explanation through GP. [Ewen & van der Hulst 2001:191]

> parameters that are relevant to the investigation of Merottic are covered in allowing only maximally binary branching constituents. The principles and

Meroitic syllable26 structure

The proposal that Meroitic syllables are mainly open was put forward by Griffith (1911:7)²⁷, who also assumed that the language contained closed syllables because kavõákn seem to prove that closed syllables existed in Meroitic. the only two Meroitic names preserved by the Greek writers, 'Epyaµérns and

through the Meroitic script itself. essentially correct but the evidence does not come from the Greek transcriptions This paper proposes that Griffith's argument for closed syllables in Merotic was

mean 'king's sister' and has been retained as a cross-linguistic title for 'queen' 4.2 Word-internal closed syllables

Kανδάκη²⁸ is the Greek transcription of a Merottic loan word which is thought to Candace.

Kανδάkη /kandakε²⁹/ phonemic transcription Greek written form of Meroitic loan word

/katakə/ ~ /kadakə/31 kike - kdke 3325-2225

phonemic transcription

Meroitic written variant forms³⁰

grapheme 5 to indicate the absence of a vowel - so why is the Meroitic word not as Griffith, and Hintze have outlined, the Meroites implemented the use of the schwa We know that there is a nasal syllable sign (A, n^2) that contains the schwa vowel, and Meroitic forms from where the Greek form was obtained, there is no nasal segment In the Greek loan-word there is a nasal segment preceding the stop, but in the

²⁵ Vowel-zero alternation in Moroccan Arabic involve the high central schwa [i]: tan ktib 'I lie'

²⁶ The syllable does not have a formal theoretical status in GP, however, it is a convenient informal label for what is in GP an onset-rhyme sequence.

²⁷ Griffith (1911:7) 'Vowelless consonants also are frequent both at and before the end of words; and not infrequently collections of three or more consonants are seen.' At the time of writing this description, the syllable based structure of Meroitic was not investigated thoroughly and so the Hintze (1971, 1974). collections of three or more consonants would contain the unmarked inherent /a/ vowel as proposed by

the transcription is given by Griffith not as Καντάκη but with 'vô' as the written cluster using the 28 It is noted that in loanwords the consonant cluster 'vr' /nt/ becomes /d/ in Modern Greek, however

this Greek loan-word is written. The delta sign is pronounced closer to the coronal stop /d/ in Classical Greek pre 300 BC, thereafter in Modern Greek it is an inter-dental fricative. There is the same unstable grapheme for delta and not tau.

The phonemic transcription of this word is slightly tentative here as it is a query as to what period this word to clarify the exact phonemic transcription. phonemic assignation with the final eta sign, in Classical Greek the vowel is central but has raised in Modern Greek cf. Allen (1987). At present, I am unable to investigate further the approximate dating of

because it is the first two syllables of the word which are important for the above analysis. Another variant spelling which does not concern this present discussion is 3,585 knwe, this is

but is important to the discussion in section 6.5.3. The vocalisation of the seemingly word-final schwa grapheme does not concern this present analysis

and the coronal stop as in (11)? written with the nasal syllable sign that should indicate no vowel between the nasal

syllable sign used to indicate no vowel

a coronal consonant followed by the schwa vowel (i) and so the single consonant signs are never used with a separate schwa grapheme (ii) for /s/, /n/ and /ti: To reiterate this point, it must be remembered that the syllable signs (bar one) indicate

system. Consequently, an analysis of the constituent structure of the Meroitic word the language at the synchronic period of the language being assigned a writing not represent this; therefore, we can speculate that this closed syllable did not exist in must be proposed. The script is capable of indicating a closed syllable for this word but the Meroites did

Kανδάkη constituent structure in GP³²

constituent structure in GP: The lexical representation of the Greek transcription would have the following

trans-constituent gov.	,	,	2	→ = = = = = = = = = = = = = = = = = = =	- A =	>	
	0 -	۲-	۵ –	٠.	o -	- -	
	-	_	_	_	_	-	
	×	×	×	×	XX	×	
	-	_	_	_	- /	-	
	Z	0	_	0 7	Z /	0	
			-		=		
Κανδακη /kandake/ 'king's sister'	*		7		7		(12)

The nasal consonant attaches to the branching rhyme which is trans-constituent governed by the following coronal stop in onset position. ³³

To explain the Meroitic lexical form, which does not show the nasal segment, a

stipulation of the syllable structure has to be proposed:

and so this is a tentative analysis at present.

The coda licensing principle states that 'a rhymal adjunct position must be licensed by an onset

Meroitic branching rhymes parameter34

syllable: attaching to the branching rhyme level. This produces a nasalised vowel on the initial attached to the first nuclear position rather than violating the parameter setting by position but not in Meroitic? It is proposed here that the nasal segment in Meroitic is Why is this nasal element manifested in the Greek transcription in a consonantal

<u>c</u>

Compare the nasal segment attaching to the rhymal position in the Greek forms:

consonantal position. not contain nasal vowels and therefore it would attach to the branching rhyme in not notated. The nasal segment resurfaces in the Greek transcriptions as Greek does The nasalised vowel is not apparent in the Meroitic script because nasalisation was

in a much earlier phase of the language the nasal was a consonantal feature, as if nasa writing system was implemented. This is possibly where evidence can be adduced that but it is possible that they belonged to an earlier phase of the language before the This analysis can still support Griffith's proposal of closed syllables (word internally)

could therefore be the case that the nasal does not surface in rhymal position but is there to indicate the quality of voicing on the stop. The analysis of Griffith's Greek loan word needs further investigation into dating to determine a definite period. As such, there is further evidence that there could be a nasal word is still used and pronounced as 'kandesa'. This loan word in Greek needs further investigation ³² This analysis is taken directly from Griffith's (1911) discussion, as Alex Bellem pointed out to me, Modern Greek shows the feature [+voice] on stops by a preceding (orthographic) nasal segment, it segment in rhymal position in this word as Boddy (1989) notes in the modern day area of Meroe the

and rectifies loanword syllable structure by vowel epenthesis.

35 The variant form could be explained by the interned. ³⁴ This stipulation also has an implicational relationship on the occurrence of branching onsets within the language. See §2.1 on the Meroitic schwa insertion between consonant clusters in Egyptian loanwords thereby indicating that the language has the parameter set to OFF for branching constituents

the stop and not the vowel thereby changing the voicing quality of the stop from /t/ to /d/ and the vowe possible theory for the Meroitic variant form is the spontaneous voicing of the nasal could spread onto remains oral. Further investigation is forthcoming in this area The variant form could be explained by the intervocalic voicing of the coronal stop. Another

distinctive nasal vowels is generally correlated with the loss of the nasal consonant which conditioned the change from oral to nasal in the vowel. 37 language was written down. Ohala (1993:247) states that "the development of language was written down. Ohala (1993:247) states that "the development of language was written down. Ohala (1993:247) states that "the development of language was written down. Ohala (1993:247) states that "the development of language was written down. Ohala (1993:247) states that "the development of language was written down. Ohala (1993:247) states that "the development of language was written down. Ohala (1993:247) states that "the development of language was written down. Ohala (1993:247) states that "the development of language was written down. Ohala (1993:247) states that "the development of language was written down. Ohala (1993:247) states that "the development of language was written down. Ohala (1993:247) states that "the development of language was written down. Ohala (1993:247) states that "the development of language was written down. Ohala (1993:247) states that "the language was written down. Ohala (1993:247) states that "the language was written down." nasal consonant conditioning the vowel nasalisation had disappeared by the time the vowels were lexical it would be expected that the script inventors would have included an indication of nasality on vowels. ³⁶ In these forms it is highly probable the

done on the word final orthographic nasal also), it is licensed to branch by being adjacent to an onset shows the nasal segment in post-nuclear rhymal position assimilates onto the preceding vowel (as is this is precisely a case of proper government in GP. In the word canton [kāt5] the constituent structure Rilly (1999b:104) observes that French orthography distinguishes nasal vowels from nasal consonants whereby the sequence -nr- in the orthography indicates the nasal assimilates onto the preceding vowel, however when 'e' is written between this sequence -ner- the nasal is pronounced in consonant position with no nasalisation on the preceding vowel. Monik Charette pointed out to me that

	~ -	×	_		(3)	9
					-	-
41 ~	501	×	-	Z-	- >	0 4
6-	-		-	-		1
		×				
		- ×	-	-	- 0	7
					1	-
	01-	- ×	_	7		
				-		-
						0 -
						no proper gov canton [kātɔ̃]
						10
						20
						ka
						2,00
						- 3
						a
						00
						40
						er
						ins
						2
						for
						na
						2
						77
						6
						24
						ne
						S
						th
						er.
						50
						ore
						6
						no proper gov. as govering domain intervenes (therefore barrier) canton [kātō]
						rie
						2

In the word canneton [kant5] the nasal is in onset (consonantal) position whereby the orthographic 'e' indicates a nucleus position which is unrealised due to proper government:

domain

*-×-	—— (ii)O
a - x -	Z- 2
- x -	
	12 - R
×-	0
01 - x -	Z- ≈ →
	proper gov. canneton
	no interv [kant5]
	proper gov. no intervening governing canneton [kant5]

constituent. Now that this nasal is in onset position the preceding vowel is oral. Section 6.2 and 6.3 following onset to license the nucleus to branch as the empty nucleus would be the next adjacent The final nucleus (N^3) is not itself licensed due to having audible content, it is adjacent to the next nucleus on its left (N^3) and no governing domain separates two therefore making it able to properly govern the nucleus to its left and so due to the ECP 'a licensed empty nucleus has no phonetic realisation.' The nasal segment cannot attach to the rhymal adjunct in this form as there would be no

is that in Justeson's sample (§1.1) one of the script universals is that nasal consonants are often omitted before them a nasalised vowel which is apparent from Egyptian transcriptions. Another important point detail the ECP in GP.

37 See Ferguson (1963) on nasal vowels occurring from the loss of a primary nasal consonant as a language universal. Millet (1974) outlines that certain consonants in Meroitic notably /k/ and /t/ had

Word-final coronal assimilation

5 Word-Hills Coloral assumption
The following lexical forms are found in Meroitic that show the final syllable sign
A n^e is omitted when a liquid-initial suffix is attached:¹⁸

							(15a)
/habaha nø / noun	h b h n /habahan o/	3008	noun	h rp he ne /harapahana/	/salaqanø/	355/35% sleqen ^e /	Syllable sign
	}			1		1	
							(b)
noun+suffix REM 0088	/habaha-la/	5775	noun+ suffix REM 0325	< <i>ω</i> {< <i>9</i> 5 <i>y</i> h r p he-li / harapahɔ-li/	noun+suffix	3587785 s I e q e-I /saləqə-la/	Omission of syllable sign with liquid-initial suffix attached 39
[Hintze 1979:62] ⁴⁰							le sign uffix attached ³⁹

<u></u> No omission of syllable sign with liquid-initial suffix attached:

\$\$\%\\$\} \tan^{\epsilon} \tatan^{\epsilon} \taha/ \tatan^{\epsilon} \taha/ \noun+adj.	/}/w \$\hat{\lambda}\} q ure ne.lh /qurəne.laha/ /qurəne.laha/ noun+adj. REM 0521
REM 1065	359/3985/ sle qen ^e -lu /salaqan ^a -lu/ /salaqan ₀ -lu/ noun+demonstrative REM 0510

analysis still has to investigate why there is omission of this sign if it is not due to a grammatical ³⁸ Hofmann (1981:141) proposes that the nasal syllable sign is a suffix. Griffith (1912: 28) thought this sign is an affix with an adjectival meaning. Meeks (1971:7) assigns this as a nominal suffix. The

change on the noun-stem.

The liquid-initial suffixes here are thought to represent the definite article or demonstratives in

however, in Hintze's data no REM numbers are given 40 These data are taken from Hintze, where possible I have given the REM number for reference,

The two phonemic transcriptions of the data exhibiting the word-final syllable sign show the ambiguous indication of a vocalised schwa vowel or no vowel.

This section focuses on the omission of the final nasal syllable sign and its vocalisation, the vowel-zero analysis of the other schwa graphemes in the above data is discussed in section 6.5.3.

It can be seen that the final syllable sign \$\%\$ /n³/ is omitted when followed by the liquid-initial suffix when comparing (15a) and (b). This phenomenon lead Hintze to argue that the sign for the schwa is also used for no vowel and was part of the structure of the Meroitic language and not just for the transcription of foreign names. He believes that the omission of /n³/ is because the schwa in these cases is realised as null and therefore the nasal is adjacent to the liquid (16). It is well attested through sonorancy sequencing that the nasal and liquid are too near on the sonority hierarchy to make a well-formed consonant cluster. However, here we have a case of morphological concatenation at the word-level. This level 'introduces segment sequences not found in un-derived and root-level forms' (Harris 1994:22).

(16) /[saləqənø][la]/

It is now investigated as to how GP can account for these data.

A GP analysis of Meroitic final empty nuclei

We would expect an epenthetic schwa to be present in the forms of (15) to break up consonant clusters as the Meroites did for clusters in Egyptian names; if this is the case there would be no violation of the sonority⁴¹ hierarchy or Meroitic constituent structure (no branching constituents) as proposed in section 4.2. However, there is distinct omission of the word-final nasal syllabic sign in certain suffixed forms. A Gp analysis of these data can explain both the apparent omission of the final syllable in certain forms and its non-omission in others. This analysis can support Hintze's argument that in the assimilated forms the syllable sign is vowel is realised as zero and explain the non-omission of the nasal syllable sign in other forms where we would expect assimilation.

6.1 Nasal syllable sign with realised vowel

The lexical forms in (15a) are given below in (17) with their GP constituent structure showing the final syllable sign with a possible realised vowel and therefore the final nucleus is filled:

When the definite article is suffixed the form will be (18):

As there is a filled nucleus (N₄) between the nasal and the liquid this will block any assimilation or deletion of the nasal segment as they are not adjacent. This structure gives the incorrect written form as:

/saləqənəla/

Not only does this analysis give the incorrect hypothesised form as in (i) but it would contradict the proposal in section 3.1 that the schwa is not lexical but derived through unlicensed empty nuclei. We can now propose (following Hintze) why there would be no filled nucleus between these two segments to allow the deletion of the nasal to be notated.

2 Nasal syllable sign with unrealised vowel

The forms in (15a) are now analysed as having no vowel on the syllable sign resulting in a consonant final structure:

Through the analysis of the Greek transcription it is already proposed that the parameter for branching rhymes is OFF in Meroitic. We can discount the possibility for a branching rhyme for the final consonant through the coda licensing principle⁴² as there is no filled onset position strictly adjacent to license the rhyme to branch in (19), if we propose that there is no vowel following the final onset. Even if we analyse these forms with their suffixes this last onset can still not become the coda as this will constitute a resyllabification and this is a violation of the projection principle⁴³ as in (20):

⁴¹ Sonority is replaced in GP with segmental complexity

⁴² Kaye (1990) Post-nuclear rhymal positions must be licensed by a following onset.

⁴⁾ KLV (1990) Governing relations are defined at the Jevel of lexical representation and remain constant throughout a phonological derivation. As Brockhaus (1995:192) points out 'this principle allows for governing relations to be added in the course of a derivation while changing or deleting existing governing relations is prohibited.'

complexity condition Not only does the above structure violate the projection principle but also the

The segmental element compounds of the nasal and the liquid would be:

- 3 3 $n-\{A, ?, L\}$ $1-\{A, ?\}$

The complexity condition requires governors to be no less complex than their governees, here we have a violation of this condition as the governor /I/ in a transconstituent governing position is less complex than its governee /n/, thereby making this constituent structure invalid.

How can we explain these forms and the constituent structure of Meroitic?

We can invoke the GP version of the Empty Category Prinicple (ECP):45

- A p-licensed empty nucleus has no phonetic realisation.
- Empty Category Principle
 (a) A p-licensed empt
 (b) An empty nucleus An empty nucleus is p-licensed if (i) it is properly governed or (ii) it is domain-final in languages which parametrically p-license domain-final empty nuclei.

Proper Government

A nuclear position a properly governs a nuclear position b if

- a is adjacent to b on its projection,
- a is not itself licensed, and
- no governing domain separates a from b.

propose a parameter setting for Meroitic: and parametrically licensed domain-final positions. We are now in the position to constrained by the ECP where only properly governed positions may remain empty GP recognises empty skeletal positions and their distribution is very tightly

Licensed domain-final empty nuclei YES46

Towards an understanding of Meroitic phonology

As proposed in section 3.1 that schwa is only realised as the phonetic interpretation of an unlicensed empty nucleus, we now have a nucleus that is p-licensed by being domain-final and therefore should have no phonetic content. This gives the following

position and so the parameter is set to YES. such as Italian where the parameter is set to NO so domain-final nuclei are always filled, and languages such as English that allow vowels and consonants in word-final This stipulation accounts for languages that only allow vowels in word-final position

This parameter setting allows us to account for the omission of the written nasal segment. However, two other factors have an implication on the omission of the nasal, morphological concatenation. concatenation. In 6.3 vowel-zero alternation is now analysed where follows in 6.4 these being: vowel-zero alternation due to suffixation and morphological

Vowel-zero alternation

and non-syncopated vowels that is iterated across the word domain' (Harris 1994; 191). GP is able to account for this phenomenon by invoking the phonological ECP as discussed in section 6.2. Vowel-zero alternation is meant here as the process where wowels are syncopated or epenthesised and in its most extreme form show 'alternating succession of syncopated

following the nasal: p-licensed by being domain-final and so this nucleus receives no phonetic content and hence, is inaudible. The structure in (22) supports the theory that there is no vowel on the nuclear projection and there is no governing domain separating them, it is therefore properly governing N_2 and as the ECP states a properly governed nucleus is itself licensed by being a filled (lexical) domain-final category, as it is adjacent to N2 p-licensed and therefore receives no phonetic interpretation, the stem word is already The structure in (22) shows that when the suffix is attached the last nucleus N₁ is not

theory of charm (due to its ability to over-generate) cf. Backley (1993), Jensen (1994).
⁴⁵ KLV (1990:219). ⁴⁴ KLV (1985, 1990), Harris (1990) initially proposed this condition on the theory of charm and government. In light of recent revised work on limiting the elements inventory which disposes of the

⁴⁰ The two parameter settings of branching rhymes OFF, domain-final empty nuclei YES is in accordance with the four-way setting of the classification of languages' syllable typologies such as Luo a Nilo-Saharan language which shares this classification with Merotic see Kaye (1990).

nasal deletes is given in section 6.4. the liquid and nasal and consequently the nasal deletes. The reasons into why the The structure now shows that there is an adjacency of the onsets (O₁ & O₂) containing

would also be subject to proper government, we will now see in (23) how this process can apply across the word: As the form in (22) is distinct in the data of (15) as having consecutive schwas that

As this form contains schwa vowels leftwards of the properly governed nucleus and we have stated that schwas are only realised as the interpretation of an unlicensed nucleus, they are also applicable to proper government:

As N₂ is properly governed (therefore inaudible), it cannot license N₃ and so N₃ receives phonetic interpretation, N₃ being unlicensed is able to properly govern N₄, which receives no phonetic interpretation. This would lead to the form having the vowel placement of /salqənla/ where only the schwa of N₃ has phonetic content. We are now in a position to account for the omission of the nasal segment.

6.4 Morphological concatenation

domains to the phonology whereas non-analytic will not: present analysis 48 these being analytic and non-analytic. An analytic form will carry structure is visible to the phonology. Two types of morphology are relevant to this The Meroitic forms now have to be analysed to see whether the morphological

structure [[A]B]: The lexical item and its suffix of (23) analysed as an analytic form has the following

vowels are subject to proper government. See Charette (1991) for licensing accounting for French data.

4 For more information on the morphology/phonology interface see Kaye (1995). 47 Cf. Nikiema (1989) and Charette (1990) for discussion on this process in Tangale but where lexical

⁴⁹ This morphology is seen as being stress neutral, productive, no lexical selectivity and no closed syllable shortening which explains forms in English such as [[re:p]ed]. Lexical Phonology terms this

This morphology shows that primary stress is affected, lexical selectivity and closed syllable shortening takes place, consider the word [parent] with its non-analytic suffix [parental] showing the movement of the primary stress. Within Lexical Phonology this is Level 1.

> (24) Analytic form NONO analytic domain barrier NON

expect to find no omission of word final /n/ as the analytic domain is a barrier to the the nasal and therefore a non-analytic morphological form can account for this assimilation and the form should be /salqanla/, however, we do see this omission of preceding this nucleus is not adjacent to the onset of the suffix because of the domain that separates the two forms. If the Meroitic morphology was analytic we would The final nucleus in the first domain is still domain-final p-licensed but the onset

Non-analytic form

Because there are no internal domains the non-analytic morphology will be invisible to the phonology. What happens now is that we have an adjacency of the two onsets 4 and 5 this causes an OCP³² violation. The two onsets both share an alveolar place of concatenation. ⁵³ This affects so-called 'fake' (i.e. non-lexical) geminates, such as the nn in unnerved.' (1994: 173) derivation. In this guise, it intervenes in a language-particular manner to block articulation specification. As Harris points out 'the OCP...remains active during expressions, which accidentally become juxtaposed as a result of morphological In the latter function, the convention triggers coalescence of identical melodic processes which would violate it or to set off processes which repair such violations

It can be proposed that there is regressive assimilation⁵⁴ of the segmental material which is in compliance with the hypothesised form given by Hintze (1979:62) and from onset 5 to onset 4 /n-V resulting in /l-V which gives the following structuress

melodic level, adjacent identical units are disfavoured.'
⁵¹ Rilly (1999b) discusses the theory that there is a process of assimilation in Meroitic due to adjacent

segments sharing a labial place specification.
4 Kiparsky (1985:97-98), Avery and Rice (1988) argue that coronals are more prone to undergo

assimilation processes than other places of articulation.

This type of regressive assimilation is evident in languages such as English: in-logical – illogical,
Klamath (Barker 1964): honlina –hollina and Ponapean (Rehg and Sohl 1981:57): nan-leng – nalleng

discussion where he proposes that the reason why un- is insensitive to what consonant follows it is because 'they are separated by an empty nucleus' and not that they are of the domains [[A][B]]. Obligatory Contour Principle (initiated by Lebben 1973) but here following Harris (1994:172)' at the 31 This analysis is in some way contradictory to the analysis of unreal or unlawful in Kaye's (1995)

Towards an understanding of Meroitic phonology

of N: also prince (2007) and the written form we find omission of /n/ but the stability also Millet (1971) who also proposed assimilation. 56 This phonological analysis is

The structure in (26) gives us the correct written form (as of 15b)⁵⁷ in (27) below:

 Ξ

/saləqə-la/ - the schwa in bold should therefore be unrealised

deleted⁵⁸ but is now associated with onset 5, the word should be vocalised with a 'fake' geminate of the liquid'99 along with the correct realisation of the schwa vowels However, because the structure in (26) shows that the skeletal position has not

(28) /salqəl-la/

can hypothesise the following Meroitic word exemplifying why geminates were observed that the transcription of geminates in Meroitic could not be indicated.⁶⁰ We the liquid is because of the nature of the writing system. Hintze (1971, 1974) already unwritten: The reason why we don't see this assimilation resulting in the 'fake' gemination of

(29) *359179555 sleqel-l /salqəla-la/

surfacing on the first liquid, and so the geminate is omitted from the script and only one segment position is written. This would lead to the erroneous vocalisation of the inherent unmarked /a/ vowel

consonant occupies the onset of a 'dull' syllable - one that lacks an audible nucleus the script itself rather than from the Greek transcriptions. 61 This section concludes that observation that Meroitic did contain closed syllables but the evidence comes from and this is characteristic of all syllabaries (1998:141). This analysis supports Griffith's the forms in (15a) and (15b) should have the phonemic transcription as in the square following Harris's discussion that in more ancient 'eastern' traditions a word-final be a 'dull syllable' that there is no vowel on the syllable signs in these forms, also The analysis of the above forms leads us to conclude that the $/n^e/$ grapheme (\mathcal{A}) could

h b h n° ~ /habahan³/ [habahan]	< V < X	$<\omega << > > > > > $ $h r p he n' \sim $ $harapahan^2 / $ [harapahan]	355/75% sleqen ^e ~ /saləqən ⁹ /
			(E)
h b h-l /habaha-la/ [habahalla]	cvc5	$\leftarrow \omega \leqslant 95 $	355/755 s l e q e-l /salbqp-la/ [salqplla]

No omission of word-final /ne/

analysis of the word for 'ruler' qore proposes that there were two levels of the script liquid-initial suffix is attached. How do we account for this? Rilly (1999a) in his with this lexeme and the other is the official language which retains the root segment functioning, one is the colloquial language that notates an assimilation that is evident lexical items. which is a valuable consideration on why there are disparate forms between the same The forms in (15c) show no assimilation of the word-final nasal segment when

complies with: is an official document which should not show the assimilation as this example the morphology of the suffix, as this is written on a stele and as such following Rilly The analysis of the form below (i) needs further investigation into whether it is due to

These proposals were put forth by Hintze and Millet without a phonological analysis but through

evidence from the script.

The analyses presented here go somewhat towards a refutation of Aubin's (2003) proposal that the grapheme /// could have been a VC sequence through letter repetition, where the inherent vowel is specified before the consonant rather than following. If her proposal is correct we would see no assimilation process as the nasal and the liquid would be separated by a lexical vowel /a/ which is not subject to the ECP and therefore does not alternate with zero.

This would constitute a violation of the Projection Principle (Kaye 1995)

³⁹ 'Fake' geminates are formed across a morpheme boundary and 'true' geminates are internal to a

single morpheme.

See also Rilly (1999b) for a discussion on the haplography of geminate consonants and the schwa

⁶¹ In the case of the syllable signs it is proposed that in actual fact they form a class of closed syllable indicators, ones that do not contain a vowel, as they belong to the coronal class, this theory, as Monik Charette pointed out to me, has comparisons with languages such as Chinese Mandarin, Finnish etc. which also have only closed syllables drawn from a set of coronal consonants. Further research into this area is forthcoming

⁶² The lexical vowels are not subject to the ECP and proper government

see that they are liquid-initial adjectival suffixes: If we move onto the two other forms of (15c) that do not show assimilation we can

omission of the nasal syllable grapheme when this adjective is suffixed (30b): because of the forms having analytic domains (a barrier to the assimilation), this We could say that there is no assimilation in these cases with adjective suffixes proposal is discounted straightaway as we find the following form in (30a) with the

comes to be adjacent to a liquid-initial suffix (32) the assimilation takes place: that it disallows the nucleus from being realised after the nasal (31), whereby when it If we analyse the forms in (30a) and (30b) with proper government, we can see again

	⇒ -×-0 ⇒ -×-0	$^{\circ}$ -× -z $\stackrel{!}{\rightleftharpoons}$	×-0		B - x - 0	0 -×-7	(32) ⁶⁷ 0 1 1
t nasal + sto ₁ [ya ⁶⁶ -ta 	-×-0	$-\times-z\stackrel{ }{\leftarrow}$	-×-o		-×-0	_ × _ 7	(32) ⁶⁷ 0
rasal + stoj [ya ⁶⁶ -ta	-o	$-z \stackrel{ }{\rightleftharpoons}$	-0		-0	-7	(32) ⁶⁷
t t vasal + stoj	0 +	$z \stackrel{ }{\rightleftharpoons}$	0		0	7	(32)67
t t nasal + stop [yə 66 -ta	#	<u> </u> <u></u> ←		_			(32)67
t nasal + stoj [yə ⁶⁶ -ta							
B	no assi						
	n ←≠→	23	-		3	22	-
	-	-	_				_
x x x x x x	×	×	×	×	×	X	×
	_	_	_	_	_	_	_
NONONON	0 Z	Z	0	z	0	7	$(31)^{65}$ O

⁶³ This form is also found with an assimilation of the word-final nasal syllable sign. Rilly (1999a) investigates this as evidence for two levels of the script functioning; one that notates the assimilation and the other that does not.

and this timing slot is replaced by the regressive assimilated liquid: liquid triggering the OCP where the resulting form is one where the nasal has deleted The structure in (33) through proper government shows an adjacency of the nasal and

domain-final p-licensed and properly governed nuclei being unrealised and so allowing an adjacency of nasals and liquids, it has to be explained why this assimilation is not apparent in the forms of (15c) or in those of (34): the suffixes (and therefore the analytic morphological domains) but because of As this paper has investigated the assimilation is not due to the grammatical status of

44)
$$\frac{1}{2}\sqrt{3}$$
 $\frac{1}{2}$ $\frac{1}{2$

disyllabic and monosyllabic words. What these forms have in common with the two forms in (15c) is they are all

consonant final segment and the consonant initial suffix can take place? Does Meroitic impose a minimal word constraint whereby no assimilation of the

6.5.1 The OCP and haplology

morphological structure we should definitely find cases of haplology. The Meroitic occur in almost any language with enough morphology to create phonetically identical morphologically complex words and 'Haplology in one form or another, seems to best described as the avoidance of identical phonetic or phonological material in forms. Plag (1998:199) cites recent approaches to haplology have stressed that it is forms in (34) comply with research into haplology that reveals disparateness between sequences.' As Meroitic is an agglutinative language and as such has a rich Investigations into morphological haplology might indicate the reasons behind these

Data taken from Hintze (1971: 330) though no REM number given

Schwas on affixes are discussed in section 6.5.3.
 In this example we have evidence again that the syllable signs could be closed syllable indicators – μ_{r} te R^{3} in this form has a properly governed empty nucleus and so no vowel is realised.

⁶⁸ I argue elsewhere (forthcoming) that the initial grapheme 52 actually represents the /h/ phoneme and not a vowel initial sequence as has long been transcribed, thereby it is a consonantal grapheme including the unmarked lal vowel.

polysyllabic and disyllabic words. Dressler states 'thus haplology is rare in disyllabic words' (1976:45). It presupposes at least three syllables. De Lacy (1999) also discusses haplology having a constraint on words that are too small (or of only one mora) and so there is no haplologising of adjacent segments. He also sees haplology as coalescence rather than deletion of segmental material and Lawrence (1997: 382) gives evidence from Japanese that haplology also occurs in cases where the elements involved are not segmentally identical.

This paper has invoked the phonological OCP 'at the melodic level adjacent identical units are disfavoured' in the morphologically complex forms of Meroitic, Plag's (1998) definition of haplology correlates it as functioning in the same manner as the phonological OCP, it can therefore be proposed that there is a constraint on the OCP in Meroitic that disallows its application when words are of minimal length.

6.5.2 Domains as a barrier to the OCP70

What could be a barrier to the occurrence of this type of OCP in Meroitic? It can be proposed that the minimal word⁷¹ has to be made up of at least three onset-nucleus pairs and any item of this length or under prohibits the application of the OCP and therefore no assimilation takes place:

(35) O N O N O N

This proposal can be discounted when we analyse an item (of three onset-nucleus pairs) that does not show the assimilation with a hypothetical assimilation when the liquid-initial suffix is attached:

ocr adjacency of nasai & iqu	ä	-	1	-	u	7	2	,	
Or adiamental of	,	-		;	:		•		
	_	_		_	_	_	_	_	
	X	×	X	×	×	×	×	×	
	_	_	_	_	_	_	_	_	
	Z	0	Z	0	Z	0	Z	*0	(36)
p-licensed empty nucleus		Ì	_						

This structure would result in a process of regressive assimilation whereby the liquid spreads into the nasal's onset position:

articulation but share manner specification.

This section is part of an ongoing investigation see Rowan (forth – Meroitic Phonology, PhD thesis) and as such is work in progress.

and as such is work in progress.

71 Systems that impose minimal length restrictions typically allow deviations in the non-lexical vocabulary. McCarthy and Prince (1990) note that the major deviations from bi-moracity in Arabic include mono-moraic particles (wa 'and', bi 'in') and a handful of nouns such as ?ab 'father', ?ax 'brother', dam 'blood' etc. They believe that the nouns are restricted to kinship and body part terms possibly reflecting an obligatory possessive affix at an earlier stage in the language.

The erroneous structure in (37) shows there would be no violation of the minimal word structure as the liquid assimilates into the nasal's onset position and therefore does not disrupt the minimal number of onsets. It now therefore has to be declared that there is a barrier to this assimilation process in words of three and under onsetnucleus pairs. Following Charette's (2004)⁷² definition of domains (where her investigation is applied to Turkish), she proposes that domains refer to the structure of words and that their phonological structure is fixed.⁷³ This paper proposes that the phonological structure of Meroitic words is made up of three onset-nucleus pairs within the domain:

This domain structure now allows us to account for the non-assimilation seen in words that are of three or less onset-nucleus pairs. The word-final nasal is unable to assimilate with the liquid-initial suffix as there is a domain and it therefore forms a barrier to this process.

This ongoing investigation can, at this stage of the analysis, allow an account for the non-assimilation of the words in (34).

6.5.3 Can schwa be word-final?

This paper has stated that schwas in Meroitic are only realised as the manifestation of an unlicensed empty nuclei, it therefore follows that we should never find them word-finally as this position is p-licensed and as such they are inaudible (unrealised). In section 4.1 the Meroitic word \$\frac{1}{2}\frac{

74 This domain structure is not an analytic domain morphological form but a fixed phonological structure.

In Japanese the segments /si/ and /ʃi/ haplologise, they differ with regard to their place of mrticulation but share manner specification.

⁷² Charette's (2004) analysis of Turkish develops Denwood's (1998) account of Turkish words as having a templatic structure, (following an initial proposal made by Goh (1996) that Beijing Mandarin words are formed of a template).

words are formed of a template).

The reader is referred for more on Charette's (2004) discussion in this volume where she proposes templatic as referring to the morphology and domains to the structure of words and the fixed phonological structure of Turkish words which are composed of two onset-nucleus pairs.

should be unrealised as well. If this is the case, the organisational principles of the script would be perplexing.

(40)76 Meroitic / kãtakə/ ~ /kãdakə/ 'king's sister'

Domains Phonological Morphological [k ã t a] + [k a]

The investigation into this area is ongoing where it is hoped that an analysis of wordfinal consonantal signs followed by the schwa sign will elicit a deeper understanding of its ambiguous use as a vowel and vowel-zero indicator and further research into the morphological boundaries of Meroitic.

Concluding remarks

This paper has sought to address certain aspects of Meroitic phonology within the framework of a current phonological theory (GP). An investigation into Meroitic loamwords in Greek has predicted that nasalised vowels are to be found in Meroitic (and not just from Egyptian transcriptions) whereas the Greek form notes the nasal in consonantal (branching rhyme) position, from this the proposal that Meroitic contains no branching constituents has been put forward. This theory has also been able to explain the omission of the nasal segment in comparative suffixed forms through setting the domain-final p-licensed parameter to yes, the result of this is (in accordance with Hintze) that a geminated form results from regressive assimilation. The hypothesis initially proposed by Hintze and Millet is encapsulated within a phonological framework. Where this process does not take place in the expected environment further forthcoming research hopes to elicit an understanding of the domain of the minimal word as a barrier to this OCP type constraint and to the audibility of schwa when found word-finally in Meroitic.

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⁷⁵ In the same way they can be found word-initially as in ye-/y²-/.

⁷⁶ This structure is very tentative at present and is given here as a rough indication of how the word cannot end in schwa by having the p-licensing parameter set to yes.

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