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Did Proto-Chadic have velar nasals and prenasalised obstruents?

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Abstract
Ever since the Afroasiatic affiliation of Chadic as a whole was suggested by Joseph H. Greenberg (1950, 1963) in his seminal re-classification of African languages and has been generally accepted, i.e. encompassing both 'Chado-Hamitic' and 'Chadic' languages of influential pre-Greenbergian genetic classifications, the issue of whether Proto-Chadic possessed prenasalised obstruents and velar nasals has been repeatedly raised and debated in the literature, yet without final consent. Most of the 196 presently known Chadic languages would appear to possess these consonants in their synchronic phonemic inventories. The present article reviews the debate in view of recently available new insights on the historical phonology and lexical reconstruction based on data from 66 of the 79 known Central Chadic languages, i.e. the most numerous and most diverse branch of Chadic. According to these recent comparative studies of Central Chadic that allow to reconstruct Proto-Central Chadic phonology and lexicon, there is massive evidence to show that both velar nasals and prenasalised obstruents emerged as results of natural phonological processes probably already on the proto-language level, but need not be reconstructed for the proto-language's phonemic inventory. And if Proto-Central Chadic did not have these consonants as inherited phonemes, then this would also be true for its predecessor, Proto-Chadic. The major processes leading to the emergence of velar nasals and prenasalised obstruents were segmental fusion and the emergence of prenasalisation prosody that arose from the desegmentalisation and prosodification of reconstructed nasals. The article summarises the evidence and gives illustrative examples for the reconstructed phonological processes, which created segmental fusions that eventually became phonologised yielding synchronic phonemes in the modern Central Chadic languages.

Keywords: Afroasiatic, Chadic, historical phonology, prosodification, segmental fusion

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1 Introduction

Expert wisdom on the inventory of consonants in Proto-Chadic (PC) is divided, both in general terms and particularly with regard to velar nasals and prenasalised obstruents. Recent surveys (for instance, Meyer & Wolff 2019: 271; Frajyzngier & Shay 2012: 249) offer no new insights and refer the reader back to Newman (1977: 9), which still remains the authoritative view on matters. The analysis and description of co-articulated consonants in Chadic links up with a more general problem in linguistics, namely the impact of theoretical inclinations and methodological preferences of the individual linguist on the description of a language system.

> The existence of underlying segments with double articulation, such as pre-nasalized stops (frequent in Chadic), labial-velar and palatalized consonants, is to a certain degree dependent on the theoretical assumptions and the methods of phonological analysis, in particular on the way a given researcher discovers a distinction between consonant clusters and single phonemes. (Frajzyngier 2012: 508)

The present paper addresses exactly this issue against the backdrop of very recent studies on the historical phonology and lexical reconstruction in Central Chadic (see Wolff 2022; Wolff in press). Central Chadic (CC), with 79 known languages (Eberhard et al. 2021) is perceived to be not only the most numerous branch of the Chadic language family by number of known languages, but also the internally most diverse (at least by expert intuition). The aim of the paper is to throw light from the author's most recent comparative research on Central Chadic on the hitherto open question of whether PC had prenasalised obstruents, and also whether it had velar nasals.

In historical-comparative works on Chadic languages, there is little agreement among authors on how many and which consonants or consonantal series in terms of manner and place of articulation to reconstruct for the common proto-language. Stolbova (2016) reconstructs neither velar nasals nor prenasalised obstruents for PC. Schuh (2017: 22), on the other hand, lists a velar nasal ŋ (but no labialised ŋʷ) and a prenasalized series mb, nd, nz, nj, ŋg in his "schematic table of consonants widely found in Chadic lan-

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guages".[1] Schuh remains vague regarding the central questions of this paper, namely whether ŋ, mb, nd, nz, nj, ŋg can or should be reconstructed for PC. Two earlier and influential publications on Proto-Chadic reconstructions again differ in their research findings and conclusions. Jungraithmayr & Shimizu (1981: 19–20) present a rather rich "Table of Proto-Chadic consonants", which contains a prenasalised series ᵐb, ⁿd, (ⁿj), ᵑg, but no velar nasal ŋ. Finally, Newman (1977: 9) provides a list of consonants under the heading "Proto-Chadic Phonemic Inventory", in which we find neither prenasalised obstruents nor a velar nasal. Newman (1977: 11), however, explicitly addresses "[t]he problem of prenasals" and does so in a broader Afroasiatic context. His treatment can be regarded as authoritative and valid until this day and, therefore, deserves to be quoted in full. It should be pointed out that the problem of whether or not to reconstruct prenasalised obstruents for PC was already discussed at length and insightful in the earlier paper by Newman & Ma (1966: 223–225), and their answer at the time was negative. Also, Newman & Ma did not reconstruct a velar nasal.

> The reconstructed consonantal inventory presented above still does not include prenasalized consonants (mb, nd, nj, ŋg, etc.) and the problem of the origin of prenasals in Chadic remains unsolved. Greenberg (1958) had postulated their existence – mb specifically – not only for Proto-Chadic but for all of Afroasiatic. Recognizing that the original evidence was thin, Greenberg subsequently reaffirmed his position on prenasals and offered a list of nineteen etymologies as evidence "tending towards the establishment of an original [Afroasiatic] *mb" (1965: 89). Of these nineteen etymologies, fourteen drew on evidence from Chadic languages (mainly Hausa); and of these fourteen, only one is reconstructable for PC and this not necessarily with a prenasal (see word list no. 97 'place'). Thus as far as Chadic is concerned, Greenberg still hasn't begun to prove his hypothesis. Similarly, the eight Chadic etymologies with *mb proposed by Illic-Svityc (1966) are much too weak to provide any real support for the idea of prenasals in PC.
>
> The issue of prenasals is complicated because there are in fact two problems to solve: (i) did PC have prenasalized consonants and if so

1 Schuh (2017: 22) remarks on his table of consonants that "[m]any, but by no means all, are reconstructable for Proto-Chadic. No Chadic language has all these consonants, but every language has a large subset of these."

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> what subsequently happened to them in Chadic linguistic history? and (ii) what is the origin of the prenasals one now finds so widespread in the Chadic family? These may turn out to be the same or related questions but not necessarily so. They may be entirely independent questions and the failure to recognize this may partially account for our inability to make any progress towards solving the problem. In the comparative word list presented here, there is one item (no. 45) where an mb in WST [West Chadic] corresponds to an mb in BM [Biu-Mandara = Central Chadic] and a few others where b in WST corresponds to m or mb in BM. What the significance of these scattered examples is I cannot say. (Newman 1977: 11)

A major and pioneer-type contribution to comparative Chadic linguistics with a focus on Central Chadic is Gravina (2014), where he gives a table entitled "Proto-Central Chadic consonants". The table contains a "pre-nasalized" series: ᵐb, ⁿd, ⁿdz, (ᵑg), (ᵑgʷ). On the phonological status of the members of this series, he states:

> The phonemes in parentheses are those which are innovations in Central Chadic, but where it is not clear whether they originated in Proto-Central Chadic or shortly afterwards. […]
>
> There were only two nasals in Proto-Central Chadic, *m and *n. Indeed, in the majority of the present-day languages, there are only these two nasals. In a number of cases /ŋ/ has been added, and in some of these languages there is also the labialized equivalent /ŋʷ/. […]
>
> For the pre-nasalized consonants, *ᵐb and *ⁿd are well-attested. The phoneme *ⁿdz is present in only one root – *ndzah 'to sit' – though the root is extremely well-attested. The other two potential pre-nasalized consonants *ᵑg and *ᵑgʷ are difficult to establish for Proto-Central Chadic, and may or may not have existed as phonemes. They are included in the table within parentheses. (Gravina 2014: 231–232.)

To the best of the author's knowledge, there has been no more recent study that would throw conclusive light on this issue of PC phonological and lexical reconstruction.

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2 Evidence from Proto-Central Chadic lexical reconstructions

Very recently, the present author has finalised two book-length studies on the historical phonology of Central Chadic (Wolff 2022) and Central Chadic lexical reconstructions (Wolff in press). These studies address the issue of proto-language reconstruction of vowel and consonant inventories, with data from up to 66 of the 79 languages of the Central Chadic branch. At variance with the study by Gravina (2014) addressing the same issues, our present insights reveal – based on massive comparative evidence – that at least Proto-Central Chadic (PCC) should not be reconstructed with either prenasalised obstruents nor with any velar nasal. Clearly, when modern Central Chadic languages that frequently show prenasalised obstruents and velar nasals in their synchronic phonetic surface representations of reconstructable words did not retain these from PCC – how much less could they have retained these from PCC's predecessor Proto-Chadic? If PCC did not possess these consonants, then PC cannot have possessed them either. (To assume the reverse process would be more than counter-intuitive and highly improbable: Why should PCC dissolve prenasalised obstruents inherited from PC, only to allow its offspring languages to re-invent these again in individual language histories?)

How, then, can we explain the massive occurrence of prenasalised obstruents and velar nasals in modern Central Chadic languages – if not by heritage? Our recent reconstruction of PCC phonology and a lexicon of some 220 words suggests the following historical developments.

Velar nasals owe their synchronic existence in modern Central Chadic languages to possibly three distinct phonological processes:

- Homorganic assimilation of *m or *n to an abutting velar consonant.
- Very frequently occurring at the right margin of words, velar nasals mostly develop from fusion of a nasal and an abutting velar consonant. The abutting velar consonant is quite often the initial consonant of a reconstructable petrified suffix *{k^{w}(a)}. When the initial consonant of the suffix undergoes de-labialisation, which is frequently the case, the resulting surface velar nasal is plain [ŋ]. When, however, the labialising co-articula-

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tion is maintained, the resulting velar nasal also shows labialisation and surfaces synchronically as [ŋʷ]. Both plain and labialised velar nasals occur in modern Central Chadic languages and there can be considered synchronic phonemes.

- A rather doubtful rule that changes nasals to velar nasals spontaneously in right-margin position of words.

Accidental /ŋw/ clusters occur and are synchronically interpreted as labialised velar /ŋʷ/ and are transcribed as such in the database (Gravina 2015) on which our recent studies rest.

Prenasalised obstruents, which very frequently occur at the left margin of words, owe their phonetic surface emergence to four quite different phonological processes.

1. Mostly we are dealing with diachronic nasal + obstruent clusters in word-initial position, which in the database are interpreted as synchronic prenasalisation ⁿC of the word-initial consonant;
2. Quite often we deal with cases of N-prosody, by which a partially or completely de-segmentalised and prosodised petrified prefix containing a nasal consonant spreads its nasal feature across the morpheme boundary and prenasalises a root-initial or root-medial obstruent;
3. Rather rarely we see dissimilation and hardening of *m → b /m(X)_ , i.e. when *m follows another *m within the same word; subsequently [b] would undergo N-prosody to yield [ᵐb];
4. Even more rarely we may be dealing with spontaneous prenasalisation *b → ᵐb under still unidentified conditions, possibly and on occasion triggered by language contact.

In the following sections 3 and 4 of this paper, these diachronic processes will be presented in some detail and illustrated by examples from Central Chadic languages of the currently accepted 18 language groups as referred to in the most recent comparative works on Central Chadic languages (Gravina 2014; Wolff 2022; Wolff in press).

The examples underpin the plausibility of the emergence of velar nasals from conditioned allophones and fusions of nasals with velar obstruents, and of prenasalised obstruents from nasal + obstruent clusters and N-prosody affecting ‘plain’ oral obstruents. This makes it unnecessary to reconstruct velar nasals and prenasalised obstruents as single phonemes for Proto-Central Chadic, and thereby also for

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Proto-Chadic. Post-PCC diachronic developments would account for their becoming phonologised in the modern Chadic languages, where they widely occur as synchronic phonemes.

The evidence on which we base our conclusive negative answer to the question raised in the title of this paper comes from rich Central Chadic data, which were provided in a digital database by the linguist Richard Gravina and which are freely available on the internet (Gravina 2015). The data quoted in this paper stem exclusively from that database. The database contains Gravina's own Central Chadic lexical reconstructions based on a valuable compilation of data from 66 languages and language varieties including both published and massively also unpublished sources. The sources for the individual languages and language varieties are listed in Gravina (2014, 2015).

The following conventions are observed in this paper.

1. The data from the original sources as compiled in the database (Gravina 2015) are always given in *italics*.
2. Our own reconstructions of PCC simple roots are always given in **bold**.
3. All cited languages will be identified by the language group that they are considered to be affiliated to; the language group is always given in SMALL CAPITALS.
4. All reconstructions are preceded by '*'.
5. Deletion/historical loss of segments is made explicit by the symbol 'Ø'.
6. The characteristic prosodies that we need to identify in Central Chadic languages are indicated by superscript ^{ʔ}, ^{n}, ^{y}, ^{w}, both for sources and targets of glottalisation, prenasalisation, palatalisation, and labialisation.[2] These prosody effects may also be indicated by using the notations +N, +Y, +W, and +ʔ.

In order to make data analysis and reconstructions transparent, the following features of Central Chadic languages and PCC reconstructions need to be taken into account.

1. Both PCC reconstructions and their synchronic reflexes in modern CC languages mirror an underlying 'minimal vowel system' based on one phonemic vowel /a/ plus non-phonemic [ə]. In this system,

2 Note that superscript ^{w} is also used to indicate labialised co-articulation of both reconstructed velars and synchronic phonemic consonants.

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the high vowels [i, u] represent conditioned distributional allophones of /y/ and /w/ in syllable-nucleus positions. Phonetic mid and occasional long vowels in surface realisations can also be accounted for by rules of allophony and prosodic 'colouring'.

2. At the PCC level, we often do not deal with simple roots, but with augmented roots, which carry petrified morphological material, both prefixal and suffixal, from the proto-language's grammatical system.
3. PCC roots may occur in the shapes of different 'root types' depending on presence and distribution of */a/ in root-medial interconsonantal slots; this is indicated by conflated symbolisations of roots that would contain ***(a)** in parentheses.

The data and diachronic processes to be discussed will be presented in the following tabular format:

(n) Language (LANGUAGE GROUP) 'gloss' (PCC ***ROOT**)
PCC input: *root (simple or augmented)

Phonological processes	Phonological processes	Output (underlying)

Under 'Output', we will give both the data as transcribed in the database (given in *italics*) and a more abstract underlying form (given in parentheses), in which insertions of epenthetic schwa are shown (this also allows to read the form under the option that schwa was phonemic, as some authors claim for some synchronic CC languages). The examples will be followed by notes, in which we will also give a reconstructed phonemic proto-form for the individual language, in which (a) non-phonemic schwa is not indicated, and (b) the presence (or absence) of prosodies is made explicit: *^{y}/…/ for Y-prosody (palatalisation), *^{w}/…/ for W-prosody (labialisation), *^{n}/…/ for N-prosody (prenasalisation), and /…/ for absence of any prosody. Different prosodies may co-occur in one and the same word, they may even combine, like Y- and W-prosodies, to affect the same segment. Note that prosodies may affect any segment in the morpheme or word: Consonants by all four prosodies, and vowels by only Y- and W-prosodies.

For the author's view on the theoretical and methodological fundamentals of Central Chadic historical phonology and reconstructions, see Wolff (2022; Wolff in press).

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3 The emergence of velar nasals in Central Chadic languages

In the following subsections, we trace the historical emergence of velar nasals in PCC both 'plain' [ŋ] and labialised [ŋʷ], from segmental fusion of any nasal consonant with an abutting velar consonant. If the velar consonant is a 'plain' /C/ or a 'de-labialised' /Cʷ/, the result will be 'plain' [ŋ]. If the velar consonant is a labialised /Cʷ/, the resulting velar nasal will also be labialised: [ŋʷ]. In post-PCC periods, these fused pseudo-phonemes undergo phonologisation and become phonemes in the modern CC languages.

3.1 The emergence of plain /ŋ/

We discuss the emergence of plain /ŋ/ in modern CC languages in terms of three diachronic scenarios: I. Trivial homorganic assimilation of a nasal *N to an abutting velar consonant; II. Assimilation and subsequent fusion of a nasal *N with an abutting velar consonant; III. A somewhat doubtful rule of pre-pausal velarisation *N → [ŋ]/_##.

I. A natural and unspectacular process to create phonetic velar nasals in surface representations is homorganic assimilation to an abutting velar consonant. We are dealing with conditioned allophones of reconstructed */m/ and */n/. The phonetic presence of such allophonic [ŋ] may have supported the independent diachronic phonologisation of velar nasals towards synchronic phonemes in the modern languages. These processes and developments are illustrated in examples (1)–(6b).

***/n/ → [ŋ] /_k,g**

(1) Jimi (BATA) 'beer' (PCC ***vxʷa**)
PCC input: *na-kʷa-vxʷa-n

De-labialisation	Homorg. assim.	Output (Underlying)
*kʷ → k	*n → ŋ/_k; voicing k → g; prosodification *xʷ → Øʷ	ə-epenthesis; + W əʷ → u
*nØ-ka-vxʷØ-n >	*ŋ-gØ-vØʷ-n >	*ᵑgəvun* (ŋgəvəʷn)

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Note: The input is a quadri-morphemic word. The phonetic output given in the database is transcribed with a prenasalised obstruent /ᵑg/. Diachronic analysis, however, identifies this as a nasal + obstruent cluster [ŋg], in which original *n assimilates homorganically to abutting *k (= de-labialised *kʷ → k) under parallel assimilation of voice: *kʷ → k → g/ŋ_. The Proto-Jimi form can be given as *ʷ/ŋgvn/.

***/m/ → [ŋ] /_g**

(2) Mbudum (DABA) ‘to belch’ (PCC *$\mathbf{g^w\text{ɗ}\text{ɮ}a}$)
PCC input: *ma-gʷɗɮa

*gʷ → g *ɗ → r	Homorg. assim. *m → ŋ/_g	Output (Underlying) ə-epenthesis
*mØ-grɮØ >	*ŋ-grɮ >	*ŋgərɮ* (ŋgərɮ)

Note: The input is a bi-morphemic word. The phonetic output given in the database is transcribed as a nasal + obstruent cluster. This is supported by diachronic analysis. Prefixal original *m assimilates homorganically to abutting *g (= de-labialised *gʷ → g). In a parallel fashion, the word undergoes epenthetic insertion of [ə] after medial *ɗ has weakened to /r/. There are no prosody effects. The Proto-Mbudum form can be given as */ŋgrɮ/.

II. Velar nasals frequently occur at the right margin of words, where they owe their phonetic surface emergence to assimilation plus fusion of a nasal and an abutting velar consonant. The abutting velar consonant is quite often the initial consonant of a reconstructable petrified suffix *{-kʷ(a)}. When the initial consonant of the suffix has undergone de-labialisation, which is frequently the case, the resulting surface velar nasal is plain [ŋ].

***/kn/ → [ŋ]**

(3) Ouldeme (MOFU) ‘to boil’ (PCC *$\mathbf{k^w a\text{ɗ}axa}$)
PCC input: *kʷaɗaxa-y-kʷ-n

Suffixal *kʷ → k	Homorg. assim. & fusion *kn → ŋ; prosodification *y → Øʸ	Output (Underlying) + Y *aʸ → e
*kʷaɗaxa-y-k-n >	*kʷaɗaxa-Øʸ-ŋ >	*kʷaɗeheŋ* (kʷaɗaʸxaʸŋ)

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Note: The input is a quadri-morphemic word. The labialised suffix-initial *kʷ is de-labialised and fuses with adjacent *n: *kn → [ŋ]. Y-prosody changes *a → [e] in the ultimate and penultimate syllables. The Proto-Ouldeme form can be given as *ʸ/kʷaɗaxaŋ/.

(4) Matal (MANDARA) 'bird' (PCC ***ɗyakʷa**)
PCC input: *ɗyakʷa-n

Delabialisation *kʷ → k	Homorganic assimilation & fusion *kn → ŋ	Output ə-epenthesis
*ɗyakØ-n >	*ɗyaŋ >	*ɗəyaŋ*

Note: The input is a bi-morphemic word. The labialised root-final *kʷ is de-labialised and fuses with adjacent suffixal *n: *kn → [ŋ]. There are no prosody effects. The Proto-Matal form can be given as */ɗyaŋ/.

***/mg/ → [ŋ]**

(5) Hdi (LAMANG) 'to belch' (PCC ***gʷɗɮa**)
PCC input: *ma-gʷɗɮa

Re-segmentalisation *gʷ → g + w	Assim. & fusion mg → ŋ; metathesis wɮ → ɮw	Output (Underlying) ə-epenthesis; w → u
*mØ-gwØɮa >	*ŋɮw >	*ŋəɮu* (ŋəɮw)

Note: The input is a bi-morphemic word. The prefix-initial *m fuses with adjacent *g (after re-segmentalisation of *gʷ → g + w) → [ŋ]. The (re-segmentalised) approximant *w ends up in syllable-nucleus position where it automatically syllabifies to yield [u]. There are no prosody effects. The Proto-Hdi form can be given as */ŋɮw/.

III. There may still be a somewhat doubtful rule of final-nasal velarisation *N → [ŋ]/_## that changes a nasal to become a velar nasal in right-margin position of words and where this is not triggered by an abutting velar. Such a rule is known to operate in several Chadic languages, for instance, in West Chadic Hausa. However, there is no robust evidence for such a rule on the PCC level because we only have one doubtful example so far. The example may be analysed as a parallel case to the examples above, namely one of homorganic assimilation plus fusion:

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(6a) Kamwe-Futu (HIGI) 'crocodile' (PCC/Loan ***kdma~*k^{w}rma**)[3]
PCC/Loan input: *kdma-k^{w}-n

*d/r → l;	Homorg. assim.	Output (Underlying)
*k^{w} → k;	& voicing	ə-epenthesis
metathesis	*nk → ŋg	
*kn → nk		
*klmØ-n-k >	*klm-ŋg >	*kələmə^{ŋ}g* (kələməŋg)

Note: The input is a tri- or bi-morphemic word. There is comparative evidence for a petrified suffix *{n} also in other Central Chadic languages, but not for *{-k^{w}}, i.e. postulating suffixal *k^{w} to explain the velarisation of *n by assimilation and fusion would be ad hoc.

On the other hand, we may indeed deal with a rare case of spontaneous velarisation of a final nasal if we consider the actual transcription '^{ŋ}g' to indicate the presence of a final velar [ŋ]); see the alternative analysis of the same example:

(6b) Kamwe-Futu (HIGI) 'crocodile' (PCC/Loan ***kdma~*k^{w}rma**)
PCC/Loan input: *kdma-n

*k^{w} → k;	N → ŋ/_##	Output (Underlying)
*d/r → l		ə-epenthesis
*klmØ-n >	*klm-ŋ >	*kələmə^{ŋ}g* (kələməŋ)

Note: Here we assume the input to be a bi-morphemic word. There are no prosody effects. The Proto-Kamwe-Futu form of this loan can be given as */klmŋ/ or */klmŋg/ depending on our interpretation of transcribed '^{ŋ}g'.

The *N → ŋ/_## rule, however, would not account (a) for the transcription /ŋg/ indicating a final velar consonant in the example above, and (b) for word-final [ŋ^{w}] where it occurs. This makes the rule more than doubtful for PCC.

3 This root for 'crocodile' has a complex history of being borrowed and re-borrowed among Nilo-Saharan Kanuri and (Central-)Chadic languages. In the light of Kanuri *karam*, one wonders about the direction of probably very early borrowing, whether from Nilo-Saharan into Chadic or vice versa, and whether this happened once or several times, in the latter case reflecting different shapes of the original root, such as possibly ***k^{w}(a)r(a)ma** and ***k(a)d(a)ma**, which may have co-existed in the area. While ***k(a)d(a)ma** would be close to the original Chadic root (see PC *kədam, Newman 1977), it was likely borrowed into Kanuri as *karam*, and has been re-imported into Central Chadic languages as 'Pseudo'-PCC root in the shape of ***k^{w}(a)r(a)ma**.

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3.2 The emergence of labialised /ŋʷ/

We discuss the emergence of labialised /ŋʷ/ in modern CC languages in terms of two diachronic scenarios: I. Assimilation plus fusion of a nasal *N and an abutting labialised velar consonant (plus occasional subsequent de-segmentalisation and prosodification); II. Reinterpretation of a nasal + obstruent cluster as prenasalisation of the obstruent.

I. The following examples (7) and (8) display different scenarios involving root-internal and root-augmental segments in the process of creating intermediate-level phonemic /ŋʷ/ that feeds re-segmentalisation and prosodification /ŋʷ/ → ŋ + ʷ.

***/gʷn/ → /ŋʷ/ → /ŋ + ʷ/**

(7) Giziga-Muturwa (MAROUA) ‘child’ (PCC ***zgʷna**)
PCC input: *zgʷna

	Fusion *gʷn → ŋʷ; re-segmentalisation & prosodification ŋʷ → ŋ + ʷ	Output (Underlying) ə-epenthesis; + W əʷ → u
*zgʷnØ >	*zŋʷ > *zŋ + ʷ	*zuŋ* (zəʷŋ)

Note: The input is a mono-morphemic word. The Proto-Giziga-Muturwa form can be given as *ʷ/zŋ/.

***/kʷn/ → /ŋʷ/ → /ŋ + ʷ/**

(8) Lamang (LAMANG) ‘hat’ (PCC ***dzakʷa**)
PCC input: *dzakʷa-na

	Fusion *kʷn → ŋʷ; re-segmentalisation & prosodification ŋʷ → ŋ + ʷ	Output (Underlying) + W *aʷ → o
*dzakʷØ-na >	*dzaŋʷa > *dzaŋ + ʷa >	*dzoŋo* (dzaʷŋaʷ)

Note: The input is a bi-morphemic word. The Proto-Lamang form can be given as *ʷ/dzaŋa/.

II. In the following example (9), fusion creates a velar nasal, which then becomes abutting to w, which was weakened from underlying *kʷ:

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***/ŋw/ cluster**

(9) Malgwa (MANDARA) 'fly' (n.) PCC (***ɗzkʷɗa**)
PCC input: *ma-dzkʷɗa-kʷ-n

Radical *kʷ → w; suffixal *kʷ → k; *ɗ → y	Assimilation *m → n/_dz; fusion *kn → ŋ; metathesis wyŋ → ŋwy; prosodification *y → Øʸ	Output (Underlying) ə-epenthesis; + Y *dzʸ → ʤ
*mØ-dzwya-k-n >	*n-dzwya-ŋ >	
	*n-dzŋwØʸa >	ⁿʤəŋʷa (ndzʸəŋwa)

Note: The input is a quadri-morphemic word. The transcription in the database indicates a labialised velar nasal, which our historical analysis does not confirm. Rather, we suggest a nasal + obstruent cluster in which [ŋ] results from suffixal *kn and medial /w/ has come about by weakening of root-medial */kʷ/. The Proto-Malgwa form can be given as *ʸ/ndzŋwa/.

4 The emergence of prenasalised obstruents in Central Chadic

Given the overall prosodising typology of CC languages (Wolff 2022; Wolff in press), one can derive both suspicious nasal + obstruent clusters and prenasalised obstruents in modern CC languages from the reconstruction of a prefixal root augment *{ma-} of old Afroasiatic heritage (or any other prefixal root augment that contained a nasal consonant, such as *{na-}). We will restrict the discussion in this paper to *{ma-}, which is the most frequent nasal-initial root augment to be considered; our discussion would by analogy also apply to other nasal prefixes, wherever they may have played a comparable role.

Note that not all postulated *{ma} prefixes actually prosodise. We observe three stages of prosodification and desegmentalisation, see Table 1.

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Table 1. Prosodification and desegmentalisation of *{ma-}

Retention	Prosodification	Partial desegmentalisation	Complete desegmentalisation
*{ma-}	→ *m^na-	→ *m^nØ-, *Ø^{n}a-	→ *Ø^n-

It remains a continuous challenge for the synchronic description of languages to distinguish nasal + obstruent clusters from prenasalisation of obstruents. Available transcriptions by field linguists are not necessarily consistent and do not always reflect thorough phonological not to speak of phonetic analysis. Usually, and also in the case of Central Chadic languages, comparative analysis throws light on the issue as far as it suggests a nasal + obstruent cluster analysis where we have reason to assume that we are dealing with historically underlying multimorphemic structures, in which a – usually homorganic – nasal belongs to one morpheme, for instance a prefix, and the abutting obstruent to another morpheme, for instance the root. In cases where we have no evidence from such morphological analysis, it remains for the descriptive linguist to decide whether to treat the suspicious cases as nasal + obstruent clusters or as prenasalised obstruents, depending on whether or not prenasalised obstruents are considered to belong to the synchronic inventory of the language's sound system. If so, we could still be dealing with synchronic phonologisation towards prenasalised obstruents that, nonetheless and historically, derive from nasal + obstruent clusters.

4.1 Nasal + obstruent clusters

The reconstruction of a prefix *{ma-} allows us to describe the synchronic emergence of nasal + obstruent clusters. Under such analysis, we assume *{ma-} to delete its vowel */a/ → *mØ- and be retained as plain bilabial nasal consonant */m/. This nasal consonant then forms a nasal + obstruent cluster, occasionally by undergoing homorganic assimilation to the immediately following root-initial consonant. Often competing analyses are feasible whether we are dealing with a nasal + obstruent cluster or with a case of prenasalisation (see below). It is not always clear from the available transcriptions of data what process we are actually dealing with in a given example.

***m + *b → /mb/**

For the lexical item 'horn', the data contain four roots of different areal distribution. Three of the roots appear to be augmented by a

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prefixal element *{ma-}. One of these roots is analysed here (see ex. 10a–d below); it occurs in seven languages belonging to four different groups and shows root-initial */b/, which theoretically could end up in a nasal + obstruent cluster /mb/. Note, however, that in Vulum (MUSGUM) *amok* (underlying ama^{w}k) the initial /b/ has been deleted. In Vame (HURZA) *ɓaŋg^{w}am* (underlying ɓa^{ŋ}g^{w}am) and in Moloko (MOFU) *mo^{ŋ}gom* (underlying ma^{wŋ}g^{w}a^{w}m), the prefix *{ma-} prosodises and affects C_2 */k^{w}/ by N-prosody to yield surface [^{ŋ}g^{w}]. In the remaining four languages, we find an initial nasal + obstruent cluster /mb/ in three (ex. 10a–c), but genuine prenasalisation by N-prosody in one language, namely Ouldeme (MOFU), see ex. (10d).

(10a) Ga'anda (TERA) 'horn' (Areal root ***bak^{w}ama***)
Areal root input: *ma-bak^{w}ama-ɗa

*k^{w}→ʔ^{w}	Prosodification *m → m^{n}; re-segmentalisation ʔ^{w} → ʔ + ^{w}	Output (Underlying) + N *ɗ → ^{n}d; + W *a^{w} → o
*mØ-baʔ^{w}amØ-ɗa >	*m^{n}-baʔ + ^{w}am-ɗa >	*^{m}bo'om^{n}da* (mba^{w}ʔa^{w}m^{n}da)

Note: On this tri-morphemic input, both potentially possible processes operate. In initial position, the loss of the prefix-vowel */a/ yields a nasal + obstruent cluster /mb/. The partial desegmentalisation and prosodification of the prefix-consonant */m/ → m^{n} affects the final consonant of the word: *ɗ → ^{n}d. (Note that N-prosody automatically de-glottalises *ɗ → d.) Root-medial *k^{w} changed to ʔ^{w}, which becomes re-segmentalised and prosodised ʔ^{w} → ʔ + ^{w}. The Proto-Ga'anda form can be given as *^{nw}/baʔamda/.

(10b) Zulgo (MOFU) 'horn' (Areal root ***bk^{w}ma***)
Areal root input: *ma-bk^{w}ma

	Prosodification & re-segmentalisation k^{w} → k + ^{w}	Output (Underlying) ə-epenthesis; + W ə^{w} → u
*mØ-bk^{w}mØ >	*m-bk + ^{w}m >	*^{m}bukum* (mbə^{w}k^{w}ə^{w}m)

Note: The input is a bi-morphemic word. Root-medial *k^{w} undergoes re-segmentalisation and prosodification. The Proto-Zulgo form can be given as *^{w}/mbkm/.

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(10c) Gemzek (MOFU) 'horn' (Areal root ***bk^{w}ama**)
Areal root input: *ma-bk^{w}ama

	Prosodification & re-segmentalisation k^{w} → k + ^{w}	Output (Underlying) ə-epenthesis; + W ə^{w} → u; *a^{w} → o
*mØ-bk^{w}amØ >	*m-bk + ^{w}am >	^{m}*bukom* (mbə^{w}k^{w}a^{w}m)

Note: The input is a bi-morphemic word. Root-medial *k^{w} undergoes re-segmentalisation and prosodification. The Proto-Gemzek form can be given as *^{w}/mbkam/.

In the Ouldeme language, we find a different process of desegmentalisation and prosodification of the prefix *{ma-}. Here, the initial prefix-consonant desegmentalises completely and prosodises to Ø^{n}, while the prefix-vowel */a/ is retained. N-prosody affects the root-initial */b/ → [^{m}b].

(10d) Ouldeme (MOFU) 'horn' (Areal root ***bk^{w}ama**)
Areal root input: *ma-bk^{w}ama

*k^{w} → k	Prosodification *ma → Ø^{n}a	Output (Underlying) ə-epenthesis; + N b → ^{m}b
*ma-bkamØ >	*Ø^{n}a-bkam >	*a^{m}bəkam* (a^{m}bəkam)

Note: The input is a bi-morphemic word. The Proto-Ouldeme form can be given as *^{n}/abkam/.

***m + p → /mp/**

Next, let's look at the case of Mbudum (DABA) *pumpa* 'armpit'. The transcription in the database reflects an analysis in terms of nasal + obstruent cluster /mp/. All other examples from several language groups, i.e. a total of 16 languages, however, suggest by their database transcriptions that synchronically we are dealing with cases of prenasalisation by N-prosody. Given the historically grounded adjacency of the nasal (originating from a postulated PCC prefix *{ma} and occasionally involving reduplication), we reanalyse the Mbudum example indeed as a case of nasal + obstruent cluster.

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(11) Mbudum (DABA) ‘armpit’ (PCC *__xbwa__)
PCC input: *RED + ma-xbwa

*b → p; reduplication	Prosodification *w → Ø^{w}	Output (Underlying) ə-epenthesis; + W ə^{w} → u
*mp + mØ-Øpwa >	*Øp + mpØ^{w}a >	*pumpa* (pə^{w}mpa)

Note: Somewhat exceptionally (but see also ex. 18 below), the reduplication treats the petrified prefix *{ma-} as part of the root. The prefix became compensatory part of the simple root after the loss of the initial root consonant */x/, i.e. the original *ma-xbwa was turned into a pseudo-root *mpwa. This pseudo-root underwent reduplication *mp + mpwa with subsequent loss of the initial *m: *p + mpwa. This form of the word then underwent prosodification of *w → Ø^{w} and epenthetic vowel insertion. The Proto-Mbudum form can be given as *^{w}/pmpa/.

***n + *w → /ŋw/**

In the following example from Malgwa (MANDARA), the issue remains hidden by the transcription found in the database. Here, too, we are dealing with a nasal + obstruent cluster stemming from the postulated PCC prefix *{ma-} > *{na-}.[4] The prefix undergoes vowel deletion to *{nØ-}, and the initial prefix consonant */n/ homorganically assimilates to following /w/ (←*ɣ^{w}), which in turn syllabifies to [u] in syllable-nucleus position.

(12) Malgwa (MANDARA) ‘blind’ PCC (*__ɣ^{w}rpa__)
PCC input: *na-ɣ^{w}rpa-y

*ɣ^{w} → w; *r → l; *p → f	Homorg. assim.; prosodification *y → Ø^{y}	Output (Underlying) *w → u, + Y *a^{y} → e
*nØ-wlfa-y >	*ŋ-wlfa-Ø^{y} >	*ŋulfe* (ŋwlfa^{y})

Note: The input is a tri-morphemic word. The Proto-Malgwa form can be given as *^{y}/ŋwlfa/.

Often, such nasal + obstruent cluster analysis is corroborated by comparative evidence, like in the above case by two languages of the KOTOKO-CENTRAL group, which are expected to use the original

4 In MANDARA group languages, the inherited form of the prefix *{ma-} is innovated to take the shape *{na-}.

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prefix shape *{ma-}: Lagwan *nxufi* (nx^{w}ə^{w}fy), Mser *ng^{w}afɨ* (ng^{w}afə^{y}). In Lagwan, the transcription *nxufi* already suggests a nasal + obstruent cluster with only partial assimilation of *m → n/_x, likewise the transcription *ng^{w}afɨ* in Mser suggests a nasal + obstruent cluster with only partial assimilation of *m → n/_g^{w}.

***m + *t → nd**

In many examples, a majority of the CC languages suggests a transparent multimorphemic origin involving the PCC prefix *{ma-}. However, some descriptive linguists for some languages describe the resulting synchronic structures as showing prenasalised obstruents, because (a) the former presence of *{ma-} is not evident from the synchronic form, and (b) the phonological system of the language is perceived to allow prenasalised obstruents. Such is the case, for instance, for Dghweɗe *^{n}dała* 'to be cold'. The transcription indicates synchronic analysis as prenasalisation, while comparative evidence favours the analysis of non-prosodising PCC prefix *{ma-}, see *mə-tała* in almost neigbouring Podoko of the same MANDARA group and in many other languages. Therefore, we analyse the Dghweɗe examples as homorganic assimilation of *m → n before abutting */t/ → d:

(13) Dghweɗe (MANDARA) 'cold' (PCC ***tała**)
PCC input: *ma-tała

*t → d/m_	Homorg. assim. *m → n/_d	Output (Underlying)
*mØ-dała >	*n-dała >	*^{n}dała* (ndała)

Note: The input is a bi-morphemic word. There are no prosodic effects. The Proto-Dghweɗe form can be given as */ndała/.

4.2 N-prosody

Quite often, the available sources and their transcriptions suggest cases of N-prosody, by which a partially or completely de-segmentalised and prosodised petrified prefix containing a nasal consonant spreads its nasal feature across a morpheme or word and prenasalises a word-medial obstruent. For the verb 'to get well, cure, take care', comparative evidence suggests a simple PCC root ***b(a)ra**, which again tends to associate with the PCC prefix *{ma-} > *{mØ}. The simplest analysis would indeed be to analyse ***m-b(a)ra** > *mbara as containing a nasal + obstruent cluster resulting from an under-

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lying bi-morphemic structure. Yet, with the exception of one source (LAMANG group Hdi *mba*), the sources in the database for all other CC languages transcribe the synchronic root with a prenasalised bilabial in initial position, e.g. Gude (BATA) *ᵐbii*, Gavar (DABA) *ᵐbəl*, Mbuko (DABA) *ᵐbar*, Giziga-Muturwa (MAROUA) *ᵐbul*, Gidar (GIDAR) *ɨᵐbəla*.

Occasionally, the two theoretically possible competing analyses can be found reflected in the database transcriptions for closely related languages of same groups. For 'hair', for instance, in the MAROUA group both descriptions co-occur. In Giziga-Muturwa, the lexeme is described in terms of a nasal + obstruent cluster (ex. 14a), while in Mbazla the lexeme is transcribed with a prenasalised obstruent in initial position (ex. 14b). Both analyses, i.e. nasal + obstruent clustering and N-prosody, are feasible and would have some historical justification. Nonetheless, we prefer to derive both synchronic forms as historically stemming from a nasal + obstruent cluster.

(14a) Giziga-Muturwa (MAROUA) 'hair' (PCC *$\mathbf{g^wtsa}$)
PCC input: *ma-g^{w}tsa-y

	Partial assimilation	Output (Underlying)
	*m → n/_g^w;	ə-epenthesis;
	prosodification	+ Y ə^y → i;
	*y → y^y	ts → tʃ;
		*y → i
*mØ-g^{w}tsØ-y >	*n-g^{w}ts-y^y >	*ng^{w}itʃi* (ng^{w}ə^{y}ts^{y}y)

Note: The input is a tri-morphemic word. The Proto-Giziga-Muturwa form can be given as *^{y}/ng^{w}tsy/.

(14b) Mbazla (MAROUA) 'hair' (PCC *$\mathbf{g^wtsa}$)
PCC input: *ma-g^{w}tsa-k^w

*ts → z;	Homorg. assim.	Output (Underlying)
*k^w → ʔ^w	*m → ŋ/_g^w;	ə-epenthesis;
	re-segmentalisation	+ W ə^w → u;
	ʔ^w → ʔ + ^{w}	*a^w → o
*mØ-g^{w}za-ʔ^w >	*ŋ-g^{w}za-ʔ + ^{w} >	*ᵑguzo'* (ŋg^{w}ə^{w}za^{w}ʔ)

Note: The input is a tri-morphemic word. The Proto-Mbazla form can be given as *^{w}/ŋg^{w}zaʔ/.

A sharp distinction between nasal + obstruent cluster and prenasalisation (N-prosody) may serve purposes of historical analysis, but

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it says nothing about the synchronic situation in individual modern CC languages.

Clear cases of N-prosody are such as illustrated by the following examples.

***ƀ → ᵐƀ**

(15) Margi (MARGI) ‘armpit’ (PCC ***xbwa**)
PCC input: *ma-xbwa

	Prosodification	Output (Underlying)
	*m- → Øⁿ-;	ə-epenthesis;
	prosodification	+ W əʷ → u;
	*w → wʷ	+ N *ƀ → ᵐƀ;
		*w → u
*mØ-xbwØ >	*Øⁿ-xbwʷ >	*huᵐbu* (xəʷᵐbw)

Note: The input is a bi-morphemic word. The Proto-Margi form can be given as *ⁿʷ/xbw/.

***ɗ → ⁿd**

(16) Mbazla (MAROUA) ‘five’ (PCC ***ɬɗama**)
PCC input: *ma-ɬɗama-y

*ɬ → ɮ	Prosodification	Output (Underlying)
	*m- → Øⁿ-;	ə-epenthesis;
	prosodification	+ N *ɗ → ⁿd;
	*y → Øʸ	+ Y əʸ → i
*mØ-ɮɗamØ-y >	*Øⁿ-ɮɗam-Øʸ >	*ɮiⁿdam* (ɮəʸⁿdam)

Note: The input is a tri-morphemic word. The Proto-Mbazla form can be given as *ⁿʸ/ɮɗam/. (Note that N-prosody automatically de-glottalises /ɗ/ → d.)

***ɠ → ᵑɠ**

(17) Mada (MOFU) ‘to belch’ (PCC ***gʷɗɮa**)
PCC input: *ma-gʷɗɮa-a-ya

*gʷ → g	Prosodification	Output (Underlying)
	*ma- → mⁿa-;	+ N *g → ᵑg;
	prosodification	+ Y *aʸ → e
	*y → Øʸ	
*ma-gØɮa-ya >	*mⁿa-gɮa-Øʸa >	*meᵑgɮea* (maʸⁿgɮaʸa)

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Note: The input is a quadri-morphemic word. The Proto-Mada form can be given as *^{ny}/magʁaa/.

***z → ^{n}z**

(18) Vame (HURZA) 'blood' (PCC *$\mathbf{x^{w}bza}$)
PCC input: *RED-ma-x^{w}bza-y

	Prosodification	Output (Underlying)
	*m- → Ø^{n};	ə-epenthesis;
	prosodification	+ N *z → ^{n}z;
	*x^{w} → Ø^{w};	+ W ə^{w} → u;
	prosodification	+ Y *z → ʒ;
	*y → Ø^{y}	*a^{y} → e
*RED-m^{n}Ø-x^{w}Øza-y >	*m-Ø^{n}-Ø^{w}za-Ø^{y} >	*munʒe* (m^{w}ə^{wn}z^{y}a^{y})

Note: The input is a quadri-morphemic word involving reduplication (RED). At variance with the transcription in the database, comparative data support the analysis of N-prosody /^{n}z/ rather than nasal + obstruent cluster /nz/. The Proto-Vame form can be given as *^{nwy}/mza/.

***ts → ^{n}dz**

(19) Zulgo (MOFU) 'chicken' (PCC *$\mathbf{g^{w}tsk^{w}ra}$)
PCC input: *ma-g^{w}tsk^{w}ra-y

	Prosodification	Output (Underlying)
	*ma- → m^{n}a-;	ə-epenthesis;
	Prosodification	+ N ts → ^{n}dz;
	*y → Ø^{y}	+ Y *a^{y} → e, ə^{y} → i
*ma-Øtsk^{w}rØ-y >	*m^{n}a-tsk^{w}r-Ø^{y} >	*me^{n}dzik^{w}ir* (ma^{yn}dzə^{y}k^{w}ə^{y}r)

Note: The input is a tri-morphemic word. Both the prefix and the suffix undergo prosodification. The Proto-Zulgo form can be given as *^{ny}/matsk^{w}r/. (Note that N-prosody automatically voices *ts → dz.)

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***y → ^{n}y**

(20) Malgbe (KOTOKO-NORTH) 'to cut' (PCC ***ɬa**)
PCC input: *ma-ɬa-y-k^{w}-n

*ɬ → s; re-segmentalisation *k^{w} → ʔ + w	Prosodification *m → Ø^{n}; prosodification *y → y^{y}; prosodification ʔ → Ø^{ʔ}; prosodification w → w^{w}	Output (Underlying) ə-epenthesis; + N *y → ^{n}y; + Y ə^{y} → i; + ʔ *s → s^{ʔ}; + W ə^{w} → u
*mØ-sa-y-ʔw-n >	*Ø^{n}-sa-y^{y}-Ø^{ʔ}w^{w}-n >	*s'inyawun* (s^{ʔ}ə^{yn}yawə^{w}n)

Note: The input is a penta-morphemic word. A suffix consonant undergoes change and re-segmentalisation *k^{w} → ʔ + w^{w}, and both the prefix and a suffix undergo instances of prosodification. The Proto-Malgbe form can be given as *^{ʔnwy}/syawn/.

4.3 N-prosody after dissimilation and hardening

***m → b → ^{m}b**

The corpus of available data contains a small set of lexical items where dissimilation and consonant fortition *m → b would provide a plausible explanation. We will discuss the examples in sub-sets.
In the first subset, three languages from two groups are involved. Here, a labial nasal within a prefix co-occurs with another labial nasal within the root; the root nasal hardens (*m → b) and subsequently undergoes N-prosody by effect from the prefix nasal.

(21) Mafa (MAFA) 'ear, name' (PCC ***ɬma**)
PCC input: *ma-ɬma-ɗ

*ɬ → ɮ; dissimilation & fortition *m → b/*m(X)_	(i) prosodification *m- → Ø^{n}- (ii) prosodification *m- → m^{n}-; homorg. assim. *m → n/_ɮ	Output (Underlying) ə-epenthesis; + N b → ^{m}b
*mØ-ɮba-ɗ >	(i) *Ø^{n}-ɮba-ɗ >	(i) *ɮə^{m}baɗ* 'ear'
*mØ-ɮba-ɗ >	(ii) *n^{n}-ɮba-ɗ >	(ii) *nɮə^{m}baɗ* 'name'

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Note: The input is a tri-morphemic word. The prefix-initial nasal undergoes prosodification and complete de-segmentalisation for the meaning 'ear'. The prefix nasal undergoes only partial de-segmentalisation under retention of the *N segment (which homorganically assimilates to the following consonant) for the meaning 'name'. The Proto-Mafa forms can be given as *^{n}/ŋ͡bad/ for 'ear', and *^{n}/nŋ͡bad/ for 'name'.

(22a) Jimi (BATA) 'wind' (PCC ***smɗa***)
PCC input: *ma-smɗa-y-n

Dissimilation & fortition of radical *m → b/*m(a)_;	Prosodification *y → Ø^{y}; (ii) prosodification prefixal *m → Ø^{n}	Output (Underlying) ə-epenthesis; + Y ə^{y} → i
*mØ-Øbɗa-y-n >	(i) *m-bɗa-Ø^{y}-n >	*^{m}biɗən* (mbə^{y}ɗən)
*mØ-Øbɗa-y-n >	(ii) *Ø^{n}-bɗa-Ø^{y}-n >	*^{m}biɗən* (^{m}bə^{y}ɗən)

Note: The input is a quadri-morphemic word. Alternative analyses are feasible: (i) The surface prenasalised obstruent [^{m}b] could be analysed as underlying nasal + obstruent cluster /mb/, or (ii) be analysed as resulting from N-prosody. The Proto-Jimi form can be given as either (i) *^{y}/mbɗn/ or (ii) *^{ny}/bɗn/.

(22b) Margi-South (MARGI) 'wind' (PCC ***smaɗa***)
PCC input: *ma-smaɗa-k^{w}

*s → y; dissimilation & fortition radical *m → b/m(X)_; *k^{w} → w	Prosodification *m → Ø^{n}	Output (Underlying) ə-epenthesis; w → u; + N b → ^{m}b
*mØ-ybaɗØ-w >	*Ø^{n}-ybaɗ-w >	*yə^{m}baɗu* (yə^{m}baɗw)

Note: The input is a tri-morphemic word. The Proto-Margi-South form can be given as *^{n}/ybaɗw/.

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(22c) Bura (MARGI) ‘wind’ (PCC *__samaɗa__)
PCC input: *ma-samaɗa-y

Dissimilation & fortition radical	Prosodification	Output (Underlying)
*m → b/m(a)_; *ɗ → r	*m → Ø^{n}; prosodification *y → Ø^{y}	+ Y *s → ʃ; + N b → ^{m}b
*mØ-sabarØ-y >	*Ø^{n}-sabar-Ø^{y} >	*ʃa^{m}bar* (s^{y}a^{m}bar)

Note: The input is a tri-morphemic word. The Proto-Bura form can be given as *^{ny}/sabar/.

4.4 Spontaneous prenasalisation after hardening

***m → b → ^{m}b**

In a second small set of data, the root contains the consonant */m/, which undergoes hardening (*m → b) and subsequent prenasalisation.

In the first examples (23a, b), the root for ‘broom’ would appear to undergo multiple metatheses in such a way that the original prefix-initial */m/ ends up as C_2 in an intermediate root shape *smk. It would then undergo fortition (*m → b) and prenasalisation. It is not clear whether at all the originally prefixal */m/ prosodises (*m → m^{n}) for the ‘floating’ nasal feature to re-associate with the hardened [b] → [^{m}b], therefore we consider this example a potential case of spontaneous prenasalisation.

(23a) Cuvok (MAFA) ‘broom’ (PCC *__k^{w}ałɗa__)
PCC input: *ma-k^{w}ałɗa

*k^{w} → k; *ɬ → s	Multiple metathesis	Output
		fortition *m → b; + N b → ^{m}b
*ma-kasØØ >	*samak >	*sa^{m}bak*

Note: The input is a bi-morphemic word. The Proto-Cuvok form can be given as *^{n}/sabak/ with intransparent origin of the N-prosody.

The alternative option would be to analyse the prenasalised obstruent as being the result of N-prosody stemming from the original prefixal */m-/.

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(23b) Cuvok (MAFA) 'broom' (PCC *$\mathbf{k^{w}a\ɬ\dot{d}a}$)
PCC input: *ma-k^{w}aɬḍa

*k^{w} → k; *ɬ → s	Prosodification *m → m^{n} multiple metathesis *m^{n}ks > sm^{n}k	Output fortition *m → b; + N b → ^{m}b
*ma-kasØØ >	*sam^{n}ak >	*sa^{m}bak* (sa^{m}bak)

In the following example, we are dealing with an 'areal' root of the lexical item 'six' of rather restricted geographic distribution in two (north-)eastern groups only: HURZA and MAROUA. There is no robust comparative evidence to reconstruct prefixal *{ma-} with this lexical item; only Mbuko has [^{m}b], all four other languages that share this areal root do not: neither HURZA group Vame, nor MAROUA group Giziga-Muturwa, Giziga-Marva, Mbazla. We here suggest alternative analyses. In the first illustration (ex. 24a) of this unique example, we postulate – in an ad hoc fashion – the diachronic existence of a petrified prefixal root-augment *{ma-}. The postulated prefix would explain C_{1}*m → b dissimilation.

(24a) Mbuko (HURZA) 'six' (PCC *$\mathbf{mrk\dot{d}a}$)
Areal root input: *ma-mrkḍa

Dissimilation & fortition of radical *m → b/*m(a)_	Output (Underlying) ə-epenthesis
*mØ-brkØa > *m-brka >	*^{m}bərka* (mbərka)

Note: The input is a bi-morphemic word. The Proto-Mbuko form can be given as */mbrka/ with no trace of N-prosody.

Alternatively, as illustrated under (24b), we would be stuck with having to assume spontaneous *m → b fortition plus subsequent likewise spontaneous N-prosody.

(24b) Areal root input: *mrkḍa

Spontaneous fortition *m → b	Spontaneous + N b → ^{m}b	Output (Underlying) ə-epenthesis
*brkØa >	*^{m}brka >	*^{m}bərka*

Note: The input is a mono-morphemic word. The Proto-Mbuko form can be given as *^{n}/brka/ with intransparent origin of the N-prosody.

In the third example, which is a likely borrowing or re-borrowing from Nilo-Saharan Kanuri (see fn. 3), there is no comparative evi-

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dence for the presence of a prefix *{ma-} that could be the source of N-prosody. A root-medial *m undergoes fortition (*m → b) and subsequent prenasalisation to [ᵐb]. This would be a clear case of unconditioned 'spontaneous' prenasalisation, possibly reflecting yet unidentified paths of borrowing or simply analogy.

(25a) Muyang (MOFU) 'crocodile' (PCC/Loan ***kdma** ~ ***kʷrma**)
PCC/Loan input: *kʷrma

Spontaneous hardening *m → b	Spontaneous prosody + N b → ᵐb; re-segmentalisation *kʷ → k + ʷ	Output (Underlying) ə-epenthesis; + W əʷ → u
*kwrba >	*k + ʷrᵐba >	*kurᵐbu* (kʷəʷrᵐbəʷ)

Note: The input is a mono-morphemic word. The Proto-Muyang form can be given as *ⁿʷ/krba/ with intransparent origin of the N-prosody and with raising of lexical-final */a/ → [ə] → [u] (under W-prosody).

(25b) Moloko (MOFU) 'crocodile' (PCC/Loan? ***kdama**~***kʷrama**)
PCC/Loan input: *kdama

*d → r; hardening *m → b	Spontaneous prosody + N b → ᵐb	Output (Underlying) ə-epenthesis
*kraba >	*kraᵐba >	*kəraᵐba* (kəraᵐba)

Note: The input is a mono-morphemic word. The Proto-Moloko form can be given as *ⁿ/kraba/ with intransparent origin of the N-prosody.

4.5 Spontaneous prenasalisation *b → ᵐb

In the following example of a word for 'donkey', which is a likely borrowing with still unidentified donor language, there is mutual comparative support from only two languages for assuming the presence of a nasal prefix that could be the origin of N-prosody. (Two further languages show no traces of such a prefix: Buwal (DABA) *berʤeŋ*, Afade (KOTOKO-NORTH) *ɓoro*.) The examples could be analysed as straight-forward cases of spontaneous prenasalisation of */b/ → [ᵐb]. Under the assumption of the existence of a nasal prefix, however, we would deal with a case of nasal + obstruent cluster /mb/. Because of the unclear status, we will give alternative analyses below.

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(26a) Bata (BATA) 'donkey' (Loan? *__brdza__)
Loan? input: *brdza-y / *ma-brdza-y

*dz → s	Prosodification *y → Ø^{y}; (i) spontaneous +N b → ^{m}b	Output (Underlying) ə-epenthesis; +Y ə^{y} → i; +Y *a^{y} → e
(i) *brsa-y >	*^{m}brsa-Ø^{y} >	*^{m}birse* (^{m}bə^{y}rsa^{y})
(ii) *mØ-brsa-y >	*m-brsa-Ø^{y} >	*^{m}birse* (mbə^{y}rsa^{y})

Note: The input is either a bi- or tri-morphemic word. The Proto-Bata forms can be given as (i) *^{ny}/brsa/ with intransparent origin of the N-prosody or as (ii) *^{y}/mbrsa/.

(26b) Lagwan (KOTOKO-NORTH), Mazera (KOTOKO-SOUTH) 'donkey' (Loan? *__brdza__)
Loan? input: *brdza-y-k^{w} / *ma-brdza-y-k^{w}

	Prosodification *k^{w} → Ø^{w}; (i) spontaneous prenasalisation +N b → ^{m}b	Output (Underlying) ə-epenthesis; +W ə^{w} → u; *y → i
(i) *brØØ-y-k^{w} >	*^{m}br-y-Ø^{w} >	*^{m}buri* (^{m}bə^{w}ry)
(ii) *mØ-brØØ-y-k^{w} >	*m-br-y-Ø^{w} >	*^{m}buri* (mbə^{w}ry)

Note: The input is either a tri- or quadri-morphemic word. The Proto-Lagwan forms can be given as (i) *^{nw}/bry/ with intransparent origin of the N-prosody, or as (ii) *^{w}/mbry/.

5 Conclusion

The answer to the question raised in the title of this paper is negative. Based on massive comparative evidence from the reconstruction of altogether some 220 lexical items with data from up to 66 Central Chadic languages and language varieties (Wolff 2022; Wolff in press), there is no compelling reason to reconstruct neither velar nasals nor prenasalised obstruents for the phonemic inventory of the common proto-language, namely PCC. And if PCC did not have these consonants, it would be quite improbable to assume that Proto-Chadic had them, and that they became de-velarised and de-nasalised when PCC

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branched off from the rest of PC. Such a scenario is highly implausible and, therefore, it is here rejected as not being a serious historical option.

We therefore explain the presence of velar nasals and prenasalised obstruents in modern Central Chadic languages by diachronic phonologisation and thereby confirm the hypotheses that none of the proto-languages, neither PCC nor PC, had such consonants in their phonemic inventory.

This paper illustrates by a few selected examples the quasi natural conditions under which CC languages eventually and massively developed velar nasals and prenasalised obstruents in phonetic surface realisations. Since most modern CC languages have them in their synchronic inventories, the assimilation and fusion processes behind the occurrence of velar nasals and prenasalised obstruents could have happened rather early in their linguistic history. We may be dealing with phonological processes whose beginnings can be allocated to the PCC period itself, i.e. before PCC became divided into major dialect groups, and which ended in the phonologisation of these consonants to become synchronic phonemes in the modern languages.

The two types of processes that played a major role in the development were segmental fusion, which created velar nasals (plus/minus labialisation depending on input), and desegmentalisation and prosodification pertaining most often to petrified nasal prefixes that can be reconstructed for PCC. When such prefixes lost their vowels, their nasal initial consonant became adjacent to a root consonant, either the original initial C_1 or, after the latter's deletion, the following root consonant. This created nasal + obstruent clusters, which eventually became synchronically re-analysed as prenasalisation. In some cases, however, after desegmentalisation of its original carrier-segment, the disassociated nasal feature jumps the next-in-line root consonant and associates with another consonant in the root, i.e. not creating an intermediate nasal + obstruent cluster, but rather operating as straight-forward N-prosody.

Consequently, both nasal clusters (/NC/) and N-prosody (/^{n}C/) occurred in the historical development of the modern Central Chadic languages. In synchronic descriptions of these languages, however, they cannot always be told apart. The data amply show confusion between the two processes in the transcriptions available from the

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database. In historical perspective, however, informed detailed diachronic analysis can usually tell them apart.

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