

ARGUMENTS FOR THE COHERENCE OF NILO-SAHARAN

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Abstract

The Nilo-Saharan phylum of African languages was identified by Greenberg in 1963. Although widely accepted, recent decades have seen researchers both inside and outside the field of Nilo-Saharan studies reject its coherence in whole or in part. This paper argues that it is a coherent phylum with at least twelve recognised branches and that phonological, morphological, and lexical evidence exists to support this claim. Three topics are examined in detail: three-term number marking, ATR vowel harmony, and the use of *t*- and *k*- affixing. The paper argues that these cannot be explained away as typological features, since they incorporate distinctive phonology and segmental morphology. In addition, the evidence from two personal pronouns is tabulated, each of which appears to have two reconstructible forms. The paper concludes with a new model of the internal configuration of Nilo-Saharan.

Keywords: Nilo-Saharan, coherence, morphology, phonology, lexicon

1. INTRODUCTION

The introduction below consists of various sections, namely the background to Nilo-Saharan branch, an explanation of the languages that are part of Nilo-Saharan, proposals for the reconstruction of Nilo-Saharan and scepticism about the coherence of the phylum. They are discussed in that order below.

1.1 Background

The Nilo-Saharan languages constitute one of the six major language phyla on the African continent. They stretch from Tanzania to Mali, and isolated pockets of speakers are found in Upper Egypt and Morocco. Nilo-Saharan has the distinction of being the “youngest” of the world’s language phyla to be identified; prior to Greenberg (1955, 1963, 1971) there was no literature suggesting that a disparate group of languages stretching across Africa constituted a single phylum. Westermann (1911) developed a concept of *Sudansprachen* that encompassed both Nilotic languages and Niger-Congo, but he dropped this idea in later publications, while Tucker and Bryan (1966) continued to treat many Nilo-Saharan languages as “isolated units”. The first monograph on the phylum is Schadeberg (1981a), bracketed by a series of publications by Bender (1976, 1981, 1983a, 1989, 1991, 1996a, 1997, 2000a) and Ehret (1989, 2001). Its validity has been effectively asserted by a series of Nilo-Saharan conferences running since 1981, although few papers presented take a comparative approach. Mikkola (1998, 1999) re-examined the proposals for Nilo-Saharan etymologies in publications up to 1998 and tested them against external datasets from other language phyla, concluding that they

broadly support the unity of the phylum, although he expressed doubts about Songhay, Koman and Gumuz. The internal diversity of Nilo-Saharan is such that doubts about its coherence will remain, particularly among non-specialists. The intention of this paper is to present evidence for common features of phonology and morphology which go beyond the lexical evidence, which is presently the major feature of the literature.

1.2 What languages are part of Nilo-Saharan?

The first version of Nilo-Saharan developed by Greenberg (1950) only included what became his core concept of Chari-Nile, a now-discarded composite of Eastern and Central Sudanic, Kuliak, Berta, and Kunama. He worked outwards from Eastern Sudanic to gradually bring in all the language families known at that date. Greenberg (1963) gives the following groups as Nilo-Saharan:

Songhay
 Saharan (Kanuri, Teda, Beria, etc.)
 Maban (Maba, etc.)
 Fur
 Chari-Nile
 Koman (Koma, Gumuz, Mao)

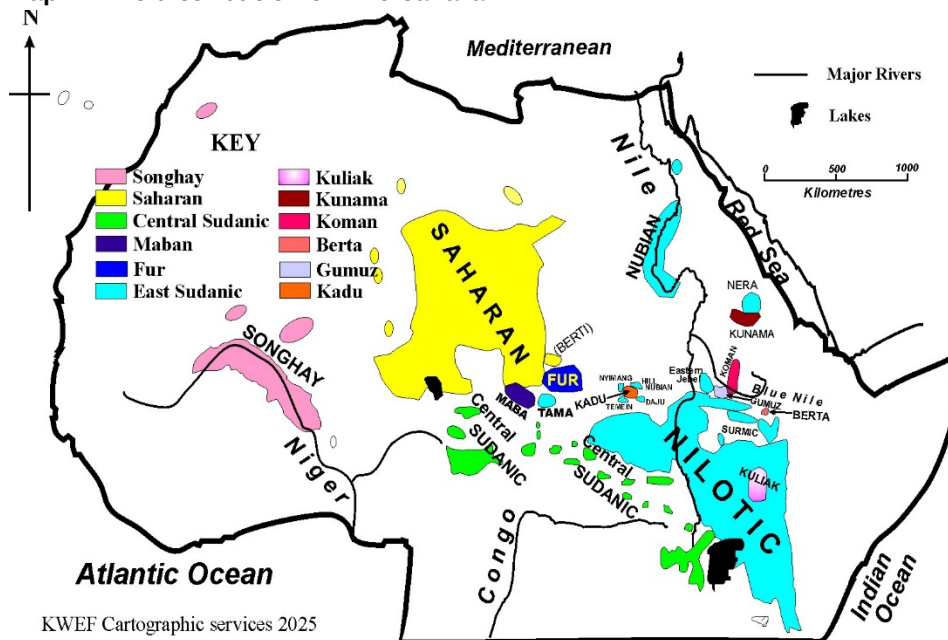
Greenberg was certainly wrong about Mao, now known to be Omotic (Bender 2000a). Moreover, he classified the “Tumtum” languages (i.e., Kadu) as Niger-Kordofanian. Since Greenberg first proposed Nilo-Saharan, it has undergone considerable expansion and renaming. Greenberg (1971) included Meroitic within Nilo-Saharan, although his evidence for this was very tenuous. Despite this, it now seems that his intuition was correct (Rilly 2009). Greenberg’s Eastern Sudanic put together many groups now considered to be independent branches of Nilo-Saharan, including Ik, while his larger grouping, Chari-Nile, included Berta and Kunama, a claim effectively dismantled in Goodman (1970). More recent research treats these as distinct, particularly the Kuliak languages (which include Ik). In addition, the discovery or reclassification of some languages has added further to the complexity of the picture of Nilo-Saharan. Bender’s writings always assume a maximal set of twelve branches for Nilo-Saharan, as shown in Table 1:

Table 1: Bender’s twelve accepted branches of Nilo-Saharan			
Songhay	Fur	Berta	Kuliak
Saharan	East Sudanic	Kunama	Kadu
Maban	Central Sudanic	Gumuz	Koman

Map 1 shows the modern-day distribution of Nilo-Saharan languages. The colour coding reflects the twelve branches listed here. A striking feature of the phylum is the extreme fragmentation and dispersal of even major subgroups such as Eastern

Sudanic. Part of this may be recent, attributable to the disruptive effects of the slave trade across Central Africa in the eighteenth and nineteenth centuries, but more pertinently, it reflects periods when group sizes were very small, and people practised either foraging, pastoralism or low-input agriculture, moving freely when climatic or security conditions were unfavourable.

Map 1: The distribution of Nilo-Saharan



KWEF Cartographic services 2025

Source: Author

East Sudanic has eight subgroups, named individually on the map: Tama, Temein, Nyimang, Daju, Nubian (Hill and Nile), Nilotic, Surmic and Nera. See Blench (2020) for a more detailed discussion of the membership and classification of East Sudanic. Chabu [=Shabo], a language isolate in southwest Ethiopia, has sometimes been considered part of Nilo-Saharan, but Blench (2022) analysed fresh data to argue that it should be excluded. Chabu has a significant body of Majang [Surmic] loans, which may be the reason for the assumption it was Nilo-Saharan.

Nilo-Saharan subgroups are very unevenly documented and have only been subjected to rather fragmentary historical reconstructions. There are reconstructions of individual subgroups, some of which consider culture-historical issues in interpreting the results, as set out in Table 2. The indented entries represent subgroups of the main Nilo-Saharan branches.

Table 2: Published reconstructions of Nilo-Saharan subgroups		
Subgroup	References	Comment
Koman	Bender (1983b, 1994), Otero (2019)	
Eastern Sudanic	Bender (1996b, 2005a), Blench (2020)	
Nilotic	Dimmendaal (1988), Rottland (1997)	Rottland (1997) includes references to unpublished work on subsets of Nilotic
Southern Nilotic	Ehret (1971), Rottland (1982, 1989)	
Eastern Nilotic	Voßen (1982)	Includes oral-historical interpretation
Surmic	Yigezu (2001)	
Daju	Thelwall (1981a, 1981b)	
Maban	Edgar (1991a, 1991b)	
Kuliak	Heine (1976), Ehret (1981)	
Kadu	Schadeberg (1994)	
Central Sudanic	Bender (1992)	
Sara-Bongo- Bagirmi	Boyeldieu (2000)	Includes oral-historical interpretation
Saharan	Cyffer (1981, 2000), Chonai (1998)	
Songhay	Nicolai (1981), Souag (pers. comm.)	Not strictly a reconstruction

Not all of these are strictly reconstructions. Edgar (1991a, 1991b), for example, is closer to a comparative wordlist. However, it is useful to be able to cite these resources for individual branches.

1.3 Proposals for the reconstruction of Nilo-Saharan

Bender (1997) and Ehret (2001) both propose reconstructions for Nilo-Saharan proto-forms; but their approaches to reconstruction are very different, and both have some quirks in terms of conventional historical linguistics. Table 3 summarises some of these differences, which are discussed in more detail in the following paragraphs.

Table 3: Comparison of Bender (1997) and Ehret (2001)		
Feature	Bender	Ehret
Membership of Nilo-Saharan	All groups in Table 1 except Chabu	Krongo (i.e., Kadu) and Chabu excluded
Literature cited	As much as possible	Highly selective
Discussion of previous authors	Some	Virtually none
Justification of subgroup coherence	Extensive	None
Sound correspondences	Little used	Extensive
Classification type	Tree + co-ordinate branching	Strict binary branching
Number of reconstructed forms	258 overall but only 173 attributed to Proto-Nilo-Saharan	1660
Cultural and historical background	Extensive	None
Linkages with other African phyla	Extensive proposals	None

These differences are very striking, and to make sense of Nilo-Saharan it is important to understand the bases for these claims. Two publications by these authors in the *Festschrift for Franz Rottland* (Voßen, Mietzner and Meißner 2000) illustrate their contrastive approaches (Bender 2000b; Ehret 2000). Ehret (2000) discusses the affiliation of “Krongo” (the Kadu languages), which he believes are not Nilo-Saharan. Normal scholarly practice would presumably be for Ehret to evaluate the approaches of scholars with more specialised knowledge of these languages who have proposed a Nilo-Saharan affiliation for Kadu [Krongo] (e.g., Schadeberg 1981b; Dimmendaal 1987; Stevenson 1991) and show why their arguments should be discarded. Instead, Ehret compares the single language Krongo to his own Nilo-Saharan reconstructions without reference to other relevant publications and concludes that there are few shared items. In the same volume, Bender (2000b), is a justification of the genetic position of Nilotic through the examination of comparative independent pronouns. He provides data tables, both of Nilotic and of the other Eastern Sudanic and nearby languages, thereby allowing the reader to judge the empirical support that exists for his argument.

The problem of sharply different conclusions concerning the same dataset arises from the methods we typically use for historical linguistics, which were developed on the basis of the study of “neater” phyla. A phylum that has gradually expanded across a terrain and falls into well-defined subgroups (e.g., Austronesian, Uralic) is always going to be closer to an ideal tree-like structure with binary splits. But the historical conditions responsible for Nilo-Saharan are quite different. It apparently dispersed across Africa in a period when foraging was still the only method of

subsistence. A recent model proposes that this was an east-west expansion and that the key factor was the availability of aquatic resources in the Saharan and Sahelian regions (Drake et al. 2011). Later expansions of unrelated phyla have encapsulated or heavily influenced each of its branches, inducing lexical and structural borrowing and extensive morphophonological shifts. History moves on, obscuring these patterns. The consequence is that lexical cognates are few, fragmentary, and may now be widely geographically dispersed, to the extent that they can be hard to distinguish from chance similarities.

The historical morphology of Nilo-Saharan also plays a role in making cognates difficult to discern. Niger-Congo languages have derivational morphology which characterises most of its branches, notably nominal class affixes and verb extensions which, importantly, show segmental cognates across the phylum. Even when lost, these features can often be recognised through fossilised morphology. Indeed, as Westermann (1935) pointed out long ago, the detailed similarities between the affixes across widely geographically disparate branches provide useful preliminary evidence for the coherence of the phylum.

By contrast, although Nilo-Saharan has typologically similar features, demonstrating segmental cognates has proven more elusive. Some branches have nominal class affix alternation (e.g., Koman, Daju, Kadu), but in contrast to Niger-Congo, these do not show alliterative concord and the affixes are not obviously linked with semantics. Languages of the Kadu group are particularly misleading, since at first they do seem to have nominal affixes, leading Greenberg (1963) to consider “Tumtum” as part of Kordofanian, within Niger-Congo. But these affixes form part of the complex three-term number marking system and are very remote from the morphosyntax of Niger-Congo (Dimmendaal 1987). Similarly, some Nilo-Saharan branches have verb extensions, but these do not show cognacy between, or even within, branches (for Fur see Waag 2010: 176-184).

There are other characteristics of Nilo-Saharan which make recognising cognates particularly challenging:

- a) words erode from the front, i.e., they lose C₁ and sometimes replace it with another consonant;
- b) sporadic metathesis of the segments within the root (which is probably related to a);
- c) conservation of unproductive affixes (as many as three on one word), making it difficult to isolate the root.

Erosion from the front is notably prevalent in East Sudanic, for example, in the Temein languages (Blench 2013, 2020). For metathesis or segment reversal, see the examples in the chapter in this volume on the Kuliak branch (Blench, this volume). For the conservation of unproductive affixes, see the examples in Krongo (Reh 1985 and re-analysis by Dimmendaal 1987).

1.4 Scepticism about the coherence of the phylum

The difficulties of citing common isoglosses and/or morphology have aroused considerable scepticism concerning the coherence of the Nilo-Saharan phylum. Comment on these lacunae has been a feature of publications such as Dixon (1997: 142) and Campbell and Poser (2008: 136). These are not specialist publications on African languages, and no detailed arguments are made in the text in support of their claims. The opinion of Dixon is not backed by any reference to the literature. Even so, they have been influential in forming opinion outside the field of African linguistics. A rather extreme position is adopted by the reference website Glottolog,¹ which denies the existence of the phylum completely. Güldemann (2010 and elsewhere) regards much of Sub-Saharan Africa as a mosaic of ‘macro-areas’ defined by typological features and sees the evidence for the coherence of the Nilo-Saharan phylum as unconvincing. Dimmendaal (2011, 2018, 2020), who certainly has a record of research in this area, has published both texts and maps excluding Songhay and Kadu. Despite including Gumuz and Koman in overviews (Dimmendaal et al. 2019), he remains personally sceptical about their affiliation. At the end of his career, even Bender (2005b) expressed doubts about the membership of Gumuz within Nilo-Saharan.

How can the issue be resolved? Two published reconstructions of Nilo-Saharan accept the reality of the phylum, but a cloud of sceptical comment remains concerning which branches are valid members. It is worth noting that the adverse literature typically does not make an argument for the exclusion of various branches. For example, Dimmendaal (2011) makes no explicit case for excluding Songhay and Kadu, but in Dimmendaal et al. (2019) a list of “common features” is attributed to “core” Nilo-Saharan, and these provide a useful starting point for assessing their phylum-wide incidence. More in-depth typological work will be required to establish whether these are present in all the branches attributed to Nilo-Saharan.

The purpose of this paper then is to defend the concept of Nilo-Saharan, to show that there are common features which run across the branches usually asserted to form its branches. In support of this claim, three traits are discussed:

- a) Three-term number-marking;
- b) ATR vowel harmony and vowels plus length;
- c) Moveable *k*- and *t*-.

All of these have a certain history in the literature, but the availability of new data for many branches makes a re-assessment of their prevalence more significant. These features are discussed in §2.

In addition, there are lexical isoglosses. Some of these were sketched long ago in Greenberg (1963) and were picked up in Bender (1997). Not all of them hold up,

¹ <https://glottolog.org/> (see Hammarstrom et al. 2025).

and some remain hard to assess for lack of data. The paper cites some of the best examples as part of the argument for coherence. The data tables are set out in §3.

2. ARGUMENTS FROM MORPHOLOGY FOR THE COHERENCE OF NILO-SAHARAN

This section draws together some of the evidence for the existence of Nilo-Saharan as a coherent phylum. It suggests that we can recognise common morphological processes across most branches, and that, furthermore, they display distinctive segmental morphology. The exception, as elsewhere, is Songhay, which has apparently lost almost all these common features.

2.1 A three-term number-marking system

Dimmendaal (2000) drew attention to a three-term system of number-marking, which is common to many branches of Nilo-Saharan. This system, also called 'replative', is where a generic term exists for a lexical item and a 'plurative' and 'singulative' are formed from it with the addition of (usually) suffixing morphology. Such systems are also recorded in Omotic and Cushitic languages, especially those close to the area where Nilo-Saharan languages are spoken.² A comparison in English is often made to terminology for liquids. Thus, we say 'beer' / 'a beer' / 'beers' to distinguish an unmarked generic term from an individual glass and multiple drinks. In other languages the system may not be so neat. Frequently, the unmarked or generic term disappears from use and only the affixed forms remain. The comparative Nilo-Saharan wordlist in Greenberg (1963: 133-148) provides many examples of this, although they are not systematically analysed. Blench (2013) has demonstrated the operation of this system in the Temein languages, part of Eastern Sudanic.

Three-term number-marking is a distinctive feature of most branches of Nilo-Saharan. Table 4 shows its presence or absence, together with the reference where it is documented.

² For examples, see Hellenthal (2010: 166-170) on Sheko (Omotic) or Savà (2005: Section 3.5) on Ts'amakko (Cushitic). I suspect the distribution of these systems is indicative of ancient contact, but this would be a lengthy argument.

Table 4: Three-term number-marking in Nilo-Saharan		
Branch	Present	Reference
Koman	Yes	Kievit and Roberston (2012)
Gumuz	Relic	Ahland (2010, 2012)
Bertha	Unclear sg/pl suffix alternation	BGLDP (2007)
Kunama-Ilit	sg/dual/pl suffix alternation	Thompson (1983)
East Sudanic	Yes	Blench (2020)
Maban	Yes	[Maba] Weiss (2009: 104)
Kadu	Yes	Blench (2006, 2021)
Kuliak	Yes	Schrock (2017: 151)
Fur	Yes	Waag (2010: 60)
Central Sudanic	Unclear sg/pl suffix alternation	[Bongo] (Moi et al. 2014)
Saharan	No	though see FN 7 for Kanuri
Songhay	Unclear sg/pl suffix alternation	Heath (1999: 127)

Where a three-term system is no longer present synchronically, there is an intriguing common feature, namely that nominal plurals are usually marked by deleting the -V suffix of the singular, with plurality marked with a long vowel or a diphthong, for example -*ii* in Bertha, -*ay* in Kunama, -*ěě* in Bongo (Central Sudanic). Intriguingly, in Gumuz, nominal plurals are marked by lengthening the stem vowel instead of a suffix. Thus:

orphan sg. *gadu-a* orphan pl. *gaáádú-á*

Songhay is harder to interpret. Koyraboro Senni (Heath 1999: 127) has a long vowel in the singular and a diphthong in the plural, which resembles Kunama. Thus:

Gloss	Indef sg.	Def sg.	Def pl.	Indef pl.
woman	<i>woy</i>	<i>woy-oo</i>	<i>woy-ee</i>	<i>woy-yaŋ</i>

which might be a relic of a three-term number-marking system.

Ironically, Dimmendaal's (2011) overview of African languages excludes Kadu, despite the very obvious presence of a three-term system. It should be added that three-term number-marking is not a purely typological feature; it is characteristic of Nilo-Saharan with sporadic examples in Cushitic, Omotic, and some branches of Niger-Congo. For example, some Kainji languages of northwest Nigeria have systems of multiple plurals marked by changing nominal prefixes (Blench 2018). However,

this seems to be local evolution, since it is not found elsewhere in related Benue-Congo languages.

2.2 ATR vowel harmony

ATR vowel system is the pairing of advanced tongue root (ATR) and retracted tongue root (RTR), which describes contrasting states of the tongue root during the pronunciation of vowels in some languages, especially in Africa, but also in Kazakh and Mongolian. See, for example, Ladefoged (1964), where this system was originally identified, and Lindau et al. (1972), which put these findings on a phonetic basis. Despite this, ATR systems were not always correctly identified in later publications on African languages. For example, Reh (1985) for Krongo and Jakobi (1989) for Fur failed to note them and only later did their presence become evident. In more recent times, publications such as Quin-Wriedt (2013) have described them in detail.

The phenomenon is thus largely restricted to Africa and is confined to Niger-Congo and Nilo-Saharan languages.³ Casali (1995, 2003, 2008) surveyed first Volta-Congo and then a sample of 100 languages continent-wide to account for these underlying systems and their reductions. African ATR systems have an underlying feature of 5+5 pairing, so that there are ten vowels in the potentially reconstructible system. Some languages, typically Kru and Grassfields, have more than ten vowels, but the additional vowels are typically allophones. The system can be represented as follows:

Front	Central	Back
i		u
ɪ		ʊ
e	ə	o
ɛ		ɔ
	a	

In this paper, ATR is represented by the feature Vowel Height. This is notated in the IPA with subscripts, thus /e̠/ for Advanced Tongue Root and /e̜/ for Retracted Tongue Root. Typically, only vowels of a single set will co-occur in a word, although compounds and other morphological processes may disrupt these patterns.

Strikingly, extremely similar systems occur in Nilo-Saharan and Niger-Congo, arguing for intensive contact at some early period. Given that ATR systems occur in the Nilo-Saharan branches in the Ethio-Sudan borderlands, far from any modern Niger-Congo languages, it is plausible that this was a feature of Proto-Nilo-Saharan. Blench (2002) compiled the material available at the time for vowel harmony in

³ There are some examples, such as the Chadic language Tangale in Nigeria, where ATR harmony has been adapted to the phonology system by intensive contact.

Nilo-Saharan, but the evidence base has expanded considerably since then. Table 5 shows the distribution of ATR vowel harmony together with 5 $\pm$ ATR vowels.

Table 5: ATR vowel harmony showing $\pm$ATR vowels				
Subgroup	Language	+/-	5-vowel	Source
Koman	Proto ⁴ -Koman	+		Otero (2019)
Gumuzic	Gumuz	-	+	Ahland (2012)
Bertha	Bertha	-	+	Andersen (1995)
Kunama	Kunama	-	+	Thompson (1983)
East Sudanic				
Nubian	Kadaru	+		Alaki and Norton (2013)
Nara	Nara	-	+	Hayward (2000)
Nyimang	Ama	+		Kingston (1996)
Taman	Tama	+		Kellermann (2000)
Surmic	P-Surmic	+		Yigezu (2001: 167)
Eastern Jebel	Gaamhg	+		Stirtz (2011)
Temein	P-Temein	+		Blench (2013)
Daju	Daju	-	+	Aviles (2008)
West Nilotic	Jumjum	+		Andersen (2004: 136)
East Nilotic	P-East Nilotic	+		Vossen (1982:299)
South Nilotic	P-South Nilotic	+		Rottland (1982: 73)
Maban	Masalit	+		SIL (2010)
Kuliak (Ik)	Ik	+		Schrock (2017)
Kadu	P-Kadu	+		Hall and Hall (2004: 6)
Fur	Fur	+		Kutsch Lojenga (2012: 36)
Central Sudanic	P-Central Sudanic	+		Blench (2019)
Saharan	Kanembu	+		Jouannet (1982: 70)
	Daza	+		Walters (2016)
	Beria	+		Jakobi and Crass (2004: 19)
Songhay	Tasawaq	-	+	Kossman (2003)
	Koyraboro	-	+	Heath (1999)

ATR vowel harmony is one of the most pervasive features in Nilo-Saharan. Although not attested in Gumuz and presumed lost in Bertha, Kunama, and Songhay, it is otherwise almost everywhere. Furthermore, wherever it occurs, full 5+5 vowel sets are typically retained, in contrast to Niger-Congo, where it can degrade. For example, in Niger-Congo, it has disappeared in Dogon, as well as much of Kwa, parts of Volta-Congo and Adamawa. ATR vowel harmony is very rare globally outside these two phyla and it is unlikely to be simply typological convergence. Ancient

⁴ Wherever the annotation P- stands before a language group below, this should be read as Proto-.

contact seems the most plausible explanation, although proposals have been made for a “Niger-Saharan” macrophylum (Blench 1995).

Individual languages, for example, within Nilotic, can exhibit a three-way vowel length contrast, but this is uncommon (Remijsen and Gilley 2008). As suggested in §2.1, long vowel affixes marking number are characteristic of those Nilo-Saharan branches which do not have synchronic three-term number-marking. This striking pattern cannot be accidental, although the process which generates this alternation is opaque. Niger-Congo shows no such pattern; where ATR systems degrade, the surface output can be highly variable and unsystematic. For example, stems may show ATR harmony, but prefixes do not necessarily show concord with them (e.g., among the Kainji languages; see Blench 2018). Some languages exhibit rightwards harmony from the prefix, and others leftwards harmony from the root.

2.3 Moveable *k-* and *t-*

Bryan (1959) first drew attention to the phenomenon of “moveable” *k-* and *t-* affixes, and this was followed up in the publications of her collaborator, Tucker (e.g., Tucker 1967a, 1967b). Moveable *k-* is one of the best-identified affixes in Nilo-Saharan. Greenberg (1981) calls it a ‘stage III article’ and Ehret (2001: 176, 181) both an “adjective suffix” and a “noun particularizing prefix”. Many languages across a wide zone of central Africa have these affixes, which have an underspecified vowel and can be suffixed, prefixed, or infix. Indeed, sometimes they are repeated at both ends of the word, as in Temein (Blench 2013). Bender (1997: 75), who considers these affixes a “noun-class formative remnant”, notes that they are widespread but not universal in Nilo-Saharan. The underspecified vowel often results in a copy of the stem vowel, though not in every case. The vowel can disappear when the stem begins with an approximant. The example shows surface forms in Temein:

Gloss	Unmarked	Plural
belly	<i>óòm</i>	<i>kómik</i>
big	<i>mbù</i>	<i>kimbik</i>
hill, stone	<i>kúreɛ</i>	<i>kukúreɛ</i>
shield	<i>wór</i>	<i>kwòrá?</i>

Two other affixes are common in Nilo-Saharan but far from universal: *n-* and *s-*. In addition, the long vowel number markers discussed in the previous section show similar behaviour, for example, moving from the suffix to the root in Gumuz (§2.1). Assigning these affixes to a single function is unlikely to succeed in the light of their mobile character. Although originally applied to nouns, they appear in verbs, adjectives, and other parts of speech. In some languages they are frozen, but elsewhere they can be productive.

Blench (2021) has reviewed the evidence for *t-*, *k-*, *n-*, and *s-* in East Sudanic, and this will not be repeated here. However, the evidence more broadly in Nilo-Saharan is summarised in Table 6.

Table 6: Presence of <i>t-</i>, <i>k-</i>, <i>n-</i>, and <i>s-</i> affixes in Nilo-Saharan					
Branch	-T	-K	-N	-S	Reference
Koman	-	-	-	-	Otero (2019)
Gumuz	-	-	-	-	Ahland (2012)
Bertha	-	-	-	-	Andersen (1995)
Kunama-Ilit	-	-	-	-	Bender (1996c)
Kuliak	+	+	+	+	[So] Carlin (1993: 73-78)
Kadu	+	+	+	-	Schadeberg (1994)
East Sudanic	+	+	+	+	Blench (2019)
Fur	+	+	+	- ⁵	Waag (2010)
Maban	+	+ ⁶	+	+	[Maba] Weiss (2009: 100)
Central Sudanic	-	-	-	-	[Ngiti] Kutsch Lojenga (1994)
Saharan	+ ⁷	-	-	-	Kanuri (Hutchison 1981)
Songhay	-	-	-	-	Heath (1999)

This constitutes quite strong evidence for a Central subgroup of Nilo-Saharan stretching from Kuliak to Maban, but not for the coherence of the larger phylum. These affixes were clearly absent in the first branchings of Nilo-Saharan, from Koman to Kunama, and were probably still present when Saharan developed, but have been subsequently lost.

3. LEXICAL EVIDENCE

The lexical evidence for the coherence of Nilo-Saharan would need to be set out at monograph length, clearly inappropriate here. However, it may be useful to revisit some of Greenberg's original proposals, particularly those for direct argument pronouns, partly because they are usually less susceptible to borrowing. Table 7 shows the forms for the first person singular pronoun as stated in the grammars consulted. I have included two pronominal forms, 1PL.INC and 2SG, which are not first person singular, where it seems plausible that these represent a semantic shift.

⁵ Although Fur does not have a bound nominal suffix associated with number, the object marker *-sɔ́* might be a remnant of the presence of *-S*.

⁶ Systematically realised as *-g* throughout Maban.

⁷ Modern Kanuri has one example of a *k-* singulative, *kâm* person, *âm* people, but earlier grammars, such as Lukas (1931) on Kanembu, point to this feature as having been more prevalent in the past.

The columns (a) to (e) represent proposals by the author for cognate sets. A commentary on each set is presented below the table.

Table 7: First person singular pronoun							
Subgroup	Language	(a)	(b)	(c)	(d)	(e)	Source
Gumuzic	P-Gumuz	<i>ára ~ ádá</i>			<i>ákwa</i> (1PL.INC)		Ahland (2012)
	Kadalu				<i>kaya</i>		
Koman		<i>*-na</i>	<i>áàíla</i> (1PL.INC)	<i>*- am</i>	<i>* aKa / aGa</i>		Otero (2019)
Bertha			<i>ali</i>				BGLD (2007)
Kunama					<i>a-ŋŋ-a</i> (POSS)	<i>a'b a</i>	Thompson (1983)
Kuliak (Ik)					<i>ńk-a</i>		Schrock (2017)
East Sudanic							
Nubian	Nobiin		<i>ay</i>				Werner (1987)
Nara	Nara						Hayward (2000)
Nyimang	Ama		<i>a(i)</i>		<i>ag</i>		Kingston (1996)
Taman	All					<i>wa,</i> <i>wo</i>	Edgar (1991c)
Surmic	Kwegu	<i>aan</i>					Hieda (1998)
Eastern Jebel	Gahmg	<i>aan</i>					Stirtz (2011)
Temein	Ronge	<i>nan</i>					Blench (2013)
Daju	Nyala				<i>aaga</i>		Thelwall (1981b)
West Nilotic	Dinka	<i>an</i>					Bender (2000b)
West Nilotic	Anywak	<i>‘āanī</i>					Reh (1996)
East Nilotic	Masai etc	<i>nanu</i>					Bender (2000b)

Table 7: First person singular pronoun							
Subgroup	Language	(a)	(b)	(c)	(d)	(e)	Source
South Nilotic	Pokot	<i>ání</i>					Crazzolara (1978)
Kadu		<i>*aʔa</i>			<i>*aga</i> (2SG)		Stevenson ms.
Maban				<i>*amV</i>			Edgar (1991b)
Fur					<i>ka</i>		Waag (2010)
Central Sudanic				<i>*-ma</i>			Blench (2019)
Saharan	Kanuri					<i>wū</i> ⁸	Hutchison (1981)
	Daza	<i>tání</i>					Walters (2016)
	Beria		<i>ʔáĩ</i>				Jakobi and Crass (2004)
	Sagato					<i>su, si</i>	Petráček (1987)
Songhay	Zarma		<i>áy</i>				Bernard and White-Kaba (1994)
	P-Northern				<i>*aɣay</i>		Nicolai (1981)

There are multiple forms, several of which are attested across Nilo-Saharan. The most promising are (a), (b), and (c), in terms of reconstructibility to Proto-Nilo-Saharan. The columns labelled (a), (b), (c), (d) and (e) are summarised below:

- (a) A common root attested across much of Nilo-Saharan, although not Songhay. It is assumed that the Gumuz form is also cognate if $n \sim r$.
- (b) The antiquity of this root depends strongly on whether Koman and Bertha retain the original form and the medial *-l-* is lost. Also, given the Proto-Koman form for the second person (Table 8), it may be a shift from the first person. The connection between East Sudanic, Saharan, and Songhay seems to be very strong.
- (c) Shared between Koman, Maban, and Central Sudanic.
- (d) The most plausible shared form, found from Gumuz to Songhay. The Kadalu language, known only from a problematic source, resembles other Nilo-

⁸ Bondarev (2006) reconstructs the Old Kanembu form as *hū*, which makes the resemblance still weaker.

Saharan forms closely. Both Bender (1997) and Ehret (2001) propose some version of this for Proto-Nilo-Saharan. It appears to have shifted to a second person singular in Kadu languages.

- (e) Scattered. The resemblance between Kanuri and Taman may be due to contact, since the Kanuri form does not resemble other Saharan forms.

Table 8 shows forms for the second person singular pronoun as cited for direct arguments. As with the first person, there are multiple forms, several of which look plausible in terms of cognates across Nilo-Saharan branches.

Table 8: Second person singular pronoun							
Subgroup	Language	(a)	(b)	(c)	(d)	(e)	Source
Gumuz			<i>*á-ma</i>				Dimmendaal et al. (2019)
Koman	P-Koman					<i>*ay</i>	Otero (2019)
	Gwama					<i>ík</i>	Otero (2019)
Bertha				<i>àngó</i>			Andersen (1995)
Kunama		<i>e?na</i>					Thompson (1983)
Kuliak (Ik)					<i>bì-</i>		Schrock (2017)
East Sudanic							
Nubian	Nobiin	<i>*e-n</i>					Werner (1987)
Nara	Nara	<i>*e-n/ en-</i>					Rilly (2020)
Nyimang	Ama	<i>jin</i> ⁹					Kingston (1996)
Taman	All	<i>*i</i>					Edgar (1991c)
Surmic	P-Southeast Surmic	<i>*ijn V</i>					Yigezu (2001)
Eastern Jebel	P-Eastern Jebel	<i>*ini</i>					Bender (1998)
Temein		<i>*nín</i>					Blench (2013)
Daju	P-Daju			<i>*ango</i>			Thelwall (1981b)
West Nilotic	Kumam	<i>in</i>					Hieda (2011)
East Nilotic	P-East Nilotic	<i>*iyye</i>					Voßen (1982)

⁹ 'Ablative'

Table 8: Second person singular pronoun							
Subgroup	Language	(a)	(b)	(c)	(d)	(e)	Source
South Nilotic	Pokot	<i>ni</i>					Crazzolara (1978)
Kadu				<i>*aga</i>			Stevenson (ms)
Maban			<i>*mVŋ</i>				Edgar (1991b)
Fur					<i>bi</i> (2PL)	<i>ɕi</i>	Waag (2010)
Central Sudanic	Madi	<i>àñĩ</i>					Blench (2019)
	Kresh		<i>umu</i>				Santandrea (1976)
Saharan	Kanuri	<i>ni</i>					Hutchison (1981)
	Daza					<i>Ñtā</i>	Walters (2016)
	Beria	<i>n-áá</i>					Jakobi and Crass (2004)
	Sagato	<i>nage</i>					Petráček (1987)
Songhay	Zarma	<i>ni</i>					Bernard and White-Kaba (1994)
	P-Northern	<i>*ni</i>					Nicolai (1981)

The most widespread form is in column (a). A summary of each one of them is given below:

- (a) **-nV*, which is distributed across the phylum. Proposed in Greenberg (1963: 131) and Bender (1997), this is the most plausible candidate for Proto-Nilo-Saharan, although it may only go back to a mesolect from Kunama onwards.
- (b) The Maban and Kresh forms are clearly related, but Gumuz is probably a chance resemblance.
- (c) The scattered attestations strongly resemble form IV in the first person singular (Table 7) and may be a semantic shift
- (d) The resemblance between Kuliak and Fur could be chance.
- (e) Miscellaneous forms are included for reference.

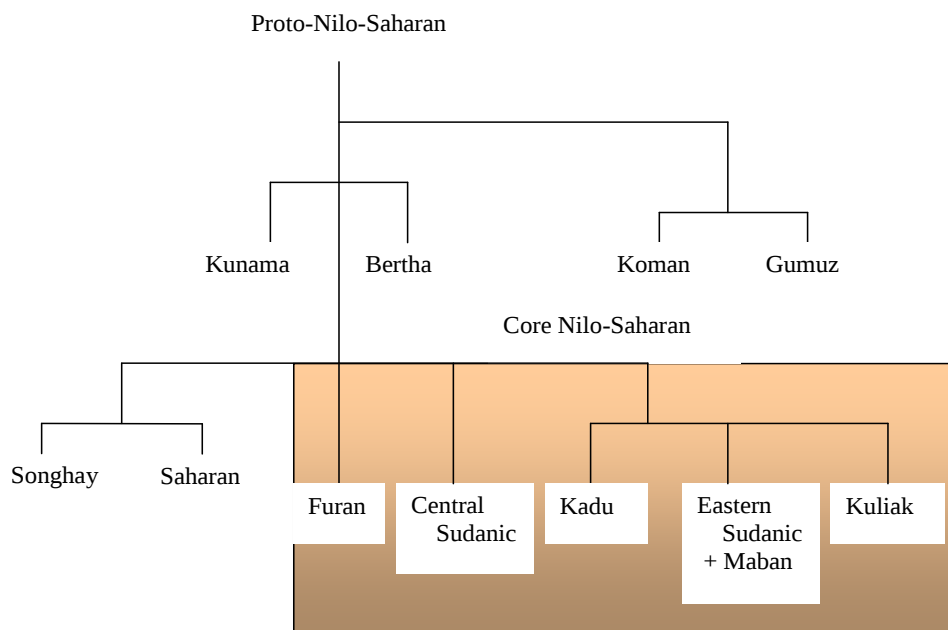
4. CONCLUSION

The evidence for the coherence of Nilo-Saharan as a phylum will never be as compelling as for other language phyla of Africa; it has been splitting up over too long a period. Some branches have undergone radical re-analysis, which makes

common elements difficult to discern. It can best be compared to phyla such as Trans-New Guinea, which, despite a general acceptance of the affiliation of a core of languages, continues to have disputes around the membership of individual subgroups. Compare, for example, the initial publication on this phylum (McElhanon and Voorhoeve 1970), which included a large number of languages, sometimes on the thinnest of evidence, and a recent, far more sceptical approach, which excludes many candidates included in the earlier publication (Pawley and Hammarström 2017).

The paper has argued that we can detect common features, phonological, morphological, and lexical, whose presence has become more compelling as the available data have expanded. Three examples have been given in the paper. Moreover, these are not typological, but are typically linked to specific segmental evidence, and are found only sporadically in the neighbouring phyla (with the exception of ATR vowel harmony). This counters the argument that this part of Africa is a 'macro-area' distinguished by overlapping typological features advanced first in Dalby (1971) and later in Güldemann (2010), since these are linked by segmental cognates and not only by structural similarities.

With this in mind, I offer a tentative 'tree' of the top-level branches of Nilo-Saharan (Figure 1). A feature of this figure, which is innovative, is the suggestion that East Sudanic and Maban form a unit. This is based on an unpublished conference paper (Blench n.d.). The structure is based on both the evidence presented and a large database of isoglosses in preparation. This should not be taken as a final statement; far more arguments will need to be presented. Nonetheless, demonstrating the coherence of Nilo-Saharan is part of the task of its researchers during the coming century.

Figure 1. A new proposal for the structure of Nilo-Saharan¹⁰

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¹⁰ The branches included in the salmon-coloured block are included within "Core Nilo-Saharan".

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