Nilotic and Eastern Sudanic Phonology in a Wider Perspective

Jan Henrik Holst

1. Introduction

There is a striking feature in the phonology of many Nilo-Saharan languages located more towards the east of the African continent, as opposed to Songhay, Kanuri and others more in the west. It is that there is a relatively large number of positions for plosives, e. g. Shilluk has five: /p ʈ t c k/. This paper shows that this trait has to be seen in a wider perspective: there is an area stretching from the east of Africa through India and South-East Asia to Australia where languages have five or more places of articulation for plosives. In contrast, in the rest of the earth, with only very rare exceptions, such languages do not occur. This is a fact that has to be recognized by areal typology. Moreover, it often correlates with the absence of fricatives, and it will be argued that this interdependence is no coincidence: in fact, these languages make use of the human vocal tract more in one of its two horizontal dimensions, in contrast to other languages that rely more on using the vertical dimension.

2. Counting places of articulation for plosives

In the following investigation we will have a look at the plosive subsystems of the consonant systems of quite a number of languages. We will count the overall number of places of articulation instead of investigating the presence of a particular place of articulation, say retroflex or uvular. To avoid possible misunderstandings and misconceptions caused by different theorical backgrounds, notational conventions and the like, some remarks about counting the plosives are in order. Note that in the following, usually the voiceless unmodified plosives are cited for demonstration. The transcription used is IPA.

First, it is important not to mistake plosives with secondary modifications for plosives with an additional place of articulation. In writing a phoneme system, a column may be used for representing a different place of articulation or a secondary modification; in evaluating such a system these two possibilities have to be kept apart. For example, /kʷ/ does not represent an extra place of articulation for

plosives but just the same one as /k/. In systems with palatalization the palatalized consonants do not represent additional places of articulation, e. g. /p pʲ t tʲ k kʲ/, as in Polish, shows just three places of articulation and can be abbreviated as /p t k/ for the purpose of this investigation. It is always important to keep /tʲ/ and /c/ apart; a well-trained linguistic ear can perceive the difference, which is not small; for the difference in articulation see Holst (2001: 47). Note in this connection the use of the symbol ṭ in Semitic and in Indian linguistics. In the classical Semitic languages, the column headed by ṭ contains the so-called emphatic consonants; they have the same place of articulation as the dental ones, but they are distinguished by a secondary modification (velarization and / or pharyngealization). In Indian linguistics, the column headed by ṭ represents the retroflex consonants, and thus the dot does represent a different place of articulation.

Second, one must not count affricates as plosives. To do this would immediately destroy the picture built up in this investigation, but it is not justified anyway. In fact, counting affricates among the plosives is just a convention that arose with one particular school of linguistics, structuralism. It is rooted in a functionalist perspective; if a hole in a phoneme system would occur and certain conditions apply, an affricate is put in; if not, it is not (with the consequence that the same affricate occurs among the plosives in the phoneme system of one language and in an extra row in the phoneme system of a different language). But affricates are no plosives; they are composed of a plosive part and a fricative part and are a class of sounds different from both plosives and fricatives; they always deserve rows of their own in phoneme systems. One further remark on affricates and plosives is in order. In fieldwork /c/ and /ɟ/ are sometimes mistaken for /t͡ʃ/ and /d͡ʒ/ respectively (or similar affricates, e. g. alveolo-palatal ones), but of course this must be avoided; they just might sound similar to an untrained ear. In a similar vein, European scholars of Sanskrit often pronounce /c/ as /t͡ʃ/ and /ɟ/ as /d͡ʒ/, but of course this does harm to what the language is really like.

Finally, note that we will not take glottal stops into account throughout the investigation. A glottal stop is certainly a plosive from an articulatory point of view: it is formed by producing a closure and releasing it just as this is done in any other place within the vocal tract for producing a plosive. However, the fact that the place of articulation is the glottis, i. e. the place which is otherwise used for a variety of features such as voice, ejectivity, breathy voice, etc., makes them stand apart remarkably. The glottal stop cannot have a voiced counterpart because the vocal cords cannot produce a closure and vibrate at the same time. The omission of glottal stops is the only procedure put forth here that could be reasonably attacked. But even if glottal stops were counted, the results of the following investigation would be almost the same. They often occur in languages of Oceania (e. g. Rapanui) and in Mesoamerica (e. g. in the Uto-Aztecan family) and would

increase their place of articulation scores by one; but because the number of places of articulation is otherwise mostly three, it would be four with the glottal stop and thus not cross the borderline to five.

Thus, the procedures for determining which sounds are counted is not arbitrary, but have a simple and sound basis. In an empirical science it is necessary to explain such procedures, to ensure that the results are not merely an artificial outcome of arbitrary choices.

The investigation was originally based on the personal experience of the author with the phonetics of the languages of the world. Later, it was checked with the 918 phoneme systems given by Maddieson (1984: 263-422) and the collection of phoneme systems by Ruhlen (1976: 153-299). It turned out that not the slightest modification of the study was necessary; rather, these data bases confirmed the statements of the investigation very well.

3. Systems with up to four places of articulation

There can be no doubt that a frequent number of positions for plosives in a consonant system is three. Maybe it is the most frequent number on a world-wide scale. For example, English has /p t k/. This type also occurs in otherwise such different languages as French (Romance), Polish (Slavic), Finnish (Uralic), Turkish (Turkic), Modern Hebrew (Semitic), Swahili (Bantu), Cree (Algonquian), Malay (Austronesian), and many more.

We will briefly have a look at systems with less than three places – one place is never found, but two are. For example, in some North American languages the labials are lacking: /t k/. Many Iroquoian and Na-Dene languages are of this type, and so are the proto-languages of these two families. There are a few other systems with just two places; e. g. in Hawaiian (from the Austronesian family), there is no alveolar plosive: /p k/. On the whole, such systems are rare.

There are many languages with four places of articulation for plosives. For example, a palatal column can be added, examples being Mandinka, Hungarian, Czech, Latvian (Holst 2001: 45) and Albanian (Buchholz and Fiedler 1987: 37), which all have a palatal column: /p t c k/. Clements (2000: 124f.) chooses this system in order to illustrate what a typical African system is like, but he remarks that his symbol /c/ is intended to cover also affricates, and in Africa the system /p t k/ may be just as frequent. Another possibility is having a retroflex column, /p t ʈ k/, as in Swedish and Norwegian. Finally, some languages add a uvular column, e. g. Ancient Hebrew, Old Georgian (Fähnrich 1994: 38), Chukchi (Kämpfe and Volodin 1995: 7) and Greenlandic (Fortescue 1984: 333): /p t k q/. Four places of articulation with plosives are certainly not typologically unusual.

4. Systems with five or more places of articulation

But as soon as we turn to languages with five places and the rarer ones with even more, a really interesting observation is made: they are found in one large area. This area stretches from eastern Africa via southern Asia to Australia. We will discuss it from west to east.

To get an idea of the type of consonant system that is more or less typical of many more eastern Nilo-Saharan languages, unless they have undergone innovations, observe the system of Shilluk (Gilley 1992):

$$
\begin{array}{ccccc}
p & \underaccent{\bullet}{t} & t & c & k \\
b & \underaccent{\bullet}{d} & d & ɟ & g \\
m & \underaccent{\bullet}{n} & n & ɲ & ŋ \\
  &   & l &   &   \\
  &   & r &   &   \\
w &   &   & j &   \\
\end{array}
$$

There might be two rhotics (for this cover term for "*r* sounds" see Dixon 1980: 144f.); it is not clear whether there is an opposition between a flap and a vibrant. Proto-West-Nilotic had five places of articulation with plosives too; in languages where these five do not exist, this has been an innovation, often caused by language contact. But most retain this system: "Bis auf wenige Ausnahmen sind bei den westnilotischen Sprachen fünf Artikulationsstellen zu unterscheiden: labial, dental, alveolar, palatal und velar" (Rottland 1981: 273). Many other Eastern Sudanic languages and even some others that are not counted as Eastern Sudanic but as Nilo-Saharan are similar in this respect. This can be gathered from the transcriptions in the introductory text by Schadeberg (1981) and is confirmed by grammars of individual languages. Some languages have the opposition *t̪* vs. *t*, whereas others have *t* vs. *ʈ*. For example, a survey of the consonants of Uduk, a Koma language (Schadeberg 1981: 294) reveals that its plosives have the same five places of articulation as in Shilluk. *t̪ can also disappear from the phoneme system by a shift to *θ*, and in the same way *d̪ > *ð occurs. In these cases it is easy to reconstruct the dental plosives because the shift from a plosive to the corresponding fricative is a frequent phonetic change and assuming it does not require an elaborated justification. Even some languages from Central Sudanic are typologically similar; this was confirmed by several fieldworkers at the congress.

Next, there are some Cushitic languages with five places of articulation for plosives. For example, Somali has /p t ʈ k q/, this can be gathered from the literature and heard well on the cassettes of Orwin (1995). (The phonemes quoted are the ones spelt *b d dh g q* – the Somali system works in terms of [±aspirated], not [±voiced] as the orthography suggests.)

India has long been identified as a linguistic area. One of the reasons is that the consonant systems there have a retroflex column and a palatal one, too; thus there are five positions for plosives. For example, Sanskrit has /p t ʈ c k/. Munda languages are usually no different in this respect, nor is Nahali. The Dravidian languages show several systems; the ones more in the south, like Tamil, again have /p t ʈ c k/. Some languages more in the north lack one of these places of articulation but instead they have uvulars; thus there are five places of articulation all in all, too (Steever 1998). Burushaski has /p t ʈ k q/.

Then, it might be surprising to note the same phenomenon in Vietnamese, because in other respects this language is typologically closer to Chinese, Tai-Kadai and Miao-Yao (isolating structure, monosyllabic words, tones etc.). The Vietnamese consonant system is presented by Nguyen (1987: 783f.) with the first row as /p t ʈ c k/. Thus five places of articulation are involved.

In the Austronesian family there are also occasionally languages of the investigated type, e. g. Paiwan (Ho 1995: 309). Such a system is also reconstructed for Proto-Austronesian (Dahl 1976: 12, 101).

Next is New Guinea. Wurm (1982) has investigated the languages of the island for many years and has made a classification the two most important genetic units of which he calls Trans-New Guinea phylum and Sepik-Ramu phylum (they cover almost the whole island). These groupings are doubted by others, but on pp. 54-64 he gives a useful comparative table of typological information on the two assumed phyla as well as on Australian and Austronesian in Melanesia. In this table the Trans-New Guinea phylum and the Sepik-Ramu phylum are both described as having "usually three to five" (p. 54) linear distinctions. This means that there are languages with plosives with five places of articulation among them.

Finally, there is Australia. Here we find languages that resemble Shilluk and other Nilotic languages most in phonetic terms. About half of the continent is covered by languages with plosives at six places of articulation: /p ʈ t ʈ c k/ (Dixon 1980: 139, 141 – voiceless and voiced symbols are interchangeable, pp. 137f.). Languages of this type are Pitta-Pitta, Kalkatungu, Warluwarra, Arabana, Kaititj, Aranda, Anindilyakwa, Yinyji-barnrdi, Bunaba and others (Dixon 1980: 139). In almost the entire other half of the continent languages have only one place of articulation less. Either the dental place of articulation is lacking, /p t ʈ c k/, e. g. in Western Desert, Walmatjari, Warlpiri, Alawa, Maung, Madhi-Madhi and others (Dixon 1980: 139). Or the retroflex place of articulation is lacking, /p ʈ t c k/, e. g. in Guugu Yimidhirr, Wik-Munkan, Mbabaram and Gamilaraay (Dixon 1980: 140). One language, Yanyuwa, has even seven places of articulation (Dixon 1980: 141f.). According to Wurm (1982: 54), there are even "up to eight" linear distinctions in Australia, but as he does not give an example, this cannot be verified. For all matters concerning Australian, see the thorough treatment by Dixon (1980: 132-142, 150-159) and the useful map (Dixon 1980: 141).

In some of the languages discussed, there are constraints on the occurrence of plosives within the word, sometimes treated under the term consonant harmony. For example, in the Dravidian language Malto a word has either velar or uvular plosives, but no mixture of them: *kukdu* 'head', *qoq* 'behind' (Steever 1998: 360f.). It is the same with dentals and retroflexes, *ṭeṭu* 'hand'. In some Nilo-Saharan languages there are quite similar restrictions.

Only very rarely does one find languages with five places of articulation that lie outside the area just described. For example, Nez Percé in North America (counted as Penutian in the classification by Edward Sapir) is such a language; it has the system /p ṭ t k q/ (Aoki 1970). According to Suárez (1983: 35), a system with */p ṭ t k q/ can also be reconstructed for Proto-Mayan, but Campbell (1997: 164) has only */p t k q/.

These data demonstrate clearly that there is a geographical area containing languages that use at least five places of articulation for plosives. As the languages are more or less grouped around the Indian Ocean, it is proposed here to call this area the *Indian Ocean Rim Area*. This term is not intended to mean that the languages in question always share traits with one another and never with languages outside the area. No linguistic area could be delimited in such exaggerated terms. Note especially that the Indian Ocean Rim Area is only built on phonetic grounds, not on any morphological or syntactic criteria.

The question then arises why this area exists; however, this cannot be answered so easily. Ideally, typology should not be an end in itself: one should not speak about common features without wondering about the reasons. But sometimes in scholarship it is necessary to state observations now in order to be able to find their causes later.

Note that genetic relationship cannot be the reason for the similarities observed. The Indo-Aryan languages are related to the other Indo-European languages which are different in this respect – even Iranian is. Consequently, Indo-Aryan has gone through a change in its consonant system. A quick glance at the reconstruction of Proto-Indo-European confirms this. The Australian languages are possibly related to the Eastern Highland languages of Papua New Guinea (Foley 1986: 269-275), and these are different, too. Moreover, Proto-Australian must be reconstructed with only four places of articulation (Dixon 1980: 150-159). Considerations of this kind could be multiplied.

5. The lack of fricatives

There is, however, a way to get ahead. The fact that the Shilluk consonant system shown above has five places of articulation for plosives is not its only remarkable trait. The other one is that there are no fricatives, and several related languages are or were similar in this respect. This is really rare in the languages of the world; there is usually at least a sibilant, /s/, and mostly there are also other fricatives. Now it is striking to observe where the other languages without fricatives are. This is the usual case in Aus-

tralia. Moreover, the phoneme system reconstructed for Proto-Dravidian does not have fricatives (Zvelebil 1992: 7). Thus the phenomenon falls within the area just established.

This makes the conclusion inevitable that five or more plosive positions and absence of fricatives are to some extent interrelated features. And there is a reason why this is so. In speaking, we humans make use of a vocal tract that has three dimensions. There is nothing remarkable to say about the breadth of the vocal tract. But it is the back / front dimension, the "depth", of the vocal tract that is responsible for the places of articulation, and it is the height that is responsible for the distinction between plosives, fricatives and approximants (and also for the main difference between consonants and vowels – Lass 1984: 109f.). Now in the geographic area discussed there is obviously a strong trend to make use of the back / front dimension of the vocal tract while not making so much use of the height dimension. Outside the area, the tendency is vice versa; here, the height distinction plays a more crucial role and the back / front dimension is used less.

Thus, humans in different parts of the world developed different ways of making use of the human speech capabilities, in fact, opposing ones. The dividing line between the Indian Ocean Rim Area and the rest of the world may be one of the most important phonetic lines that divides mankind.

6. Earlier work

Although the full extent of the Indian Ocean Rim Area has not yet been established in the literature, certain connections on a smaller scale were already known. For example, linguists have been aware of the phonetic similarities between India and Australia for a long time. This was the reason for the theory that Dravidian and Australian are related. However, typological similarities need not mean that there is a language relationship; they can mean that, but do not have to mean it. In this case, one does not find much more evidence that points to relationship (Dixon 1980: 236f., 488f.).

For Nilo-Saharan, Schadeberg (1987) has written an informed article in which he investigates two features. The first one is the reduction, i. e. absence or only marginal presence, of the opposition voiced / voiceless, which can be seen best with the plosives. The second one is the opposition dental / alveolar, or something comparable. Both features are definitely untypical elsewhere in Africa. Schadeberg obtains the following results for 19 language groups and single languages (first column: first feature, second column: second feature):

1.	Nera-bena	+	−		11.	Nyimang	−	+
2.	Kunama	−	−		12.	Temein	−	+
3.	Ingassana	+	+		13.	Kordofanian	+	+
4.	Berta	+	+		14.	Kadugli	+	+
5.	Koma	+	+		15.	Daju	−	+
6.	Didinga-Surma	+	+		16.	Fur	+	−
7.	Kuliak	+	−		17.	Tama	+	+
8.	Nilotic	+	+		18.	Maba	−	+
9.	Central Sudanic	−	+		19.	Saharan	+	+
10.	Nubian	+	+					

Schadeberg is right in concluding that there is a "linguistisches Konvergenzgebiet Ostsudan" (p. 214). About the reduction of the opposition voiced / voiceless Schadeberg states that it is "ein Phänomen mit beträchtlicher regionaler Verbreitung" (p. 219). Some Dravidian languages, e.g. Tamil, also show this feature, and in Australia it is almost universally present. However, many languages outside the area also show this trait, for example about the northern half of the Uralic language family, parts of Turkic, all Eskimo-Aleut languages and parts of Uto-Aztecan. Schadeberg also presents a map (p. 224).


7. Nilotic and Australian

Finally, it is to be stressed how similar some Nilotic languages and others counted as Nilo-Saharan are to Australian languages in phonetic terms. This is evident even from listening to them. There are, as already discussed, many places of articulation and, especially on the Australian side, often no fricatives. Next, there is usually a nasal corresponding to each plosive. Moreover, in Australia an opposition between a flap and a vibrant is frequent, something that, as mentioned above, might also be found in Nilotic. (It crops up here and there elsewhere in the world, e. g. in Hausa – Newman 1980 –, Spanish, Basque, Albanian, Armenian and some Caucasian languages.)

As a morphological and syntactic point, there may be a parallel because of the existence of ergativity, but ergativity is widespread on the earth (see the survey by Dixon 1994: 2-5) and one must not make too much of it unless more particular traits are known. It would be useful to find out in fieldwork more exactly what ergative properties occur in Nilotic.

The phonetic similarity is especially great with the Australian languages from the Cape York peninsula. This is due to two innovations in this part of Australia, the northeastern tip of the continent. First, languages have acquired more vowels – in contrast to the usual Australian vowel system /i u a/, mid vowels and others have developed. Second, the structure of many words has changed from CVCV to CVC by dropping the

last vowel, thus bringing the words closer to Nilotic as regards phonotactics. Phonotactics are also more similar because a greater variety of consonants can occur at the beginning of words than elsewhere in Australia.

Australianists have found out how the dental and the retroflex places of articulation have developed in the Australian languages which have them. The retroflex column has split off from the alveolar one (Dixon 1980: 155–157), and this is not surprising since this is the usual procedure, also being encountered in Swedish, Norwegian and Sanskrit. More interesting is the dental column: it has split off from the palatal one (Dixon 1980: 153f., 157). This is remarkable because these two places of articulation are quite far from one another in the vocal tract; it is possible nevertheless because they are both articulated with the blade of the tongue (Dixon 1980: 136), and there is considerable auditive similarity, too. The development can be charted as follows:

$$*p \qquad *t \qquad *c \quad *k$$

$$p \quad t \quad t \quad t \quad c \quad k$$
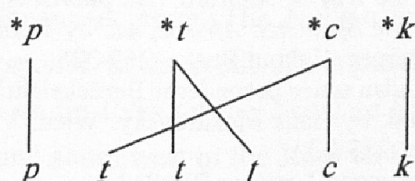
Maybe these findings can be made use of when investigating where the dental and retroflex consonants in the Nilotic and other Nilo-Saharan languages have come from.

It is certain that in the period of linguistics we experience at the moment, typology, areal linguistics and historical linguistics can enrich one another and can be combined to provide new insights.

Acknowledgement

References

Aoki, Haruo 1970. *Nez Percé Grammar*. Berkeley: University of California Press.
Buchholz, Oda and Wilfried Fiedler 1987: *Albanische Grammatik*. Leipzig: Verlag Enzyklopädie.
Campbell, Lyle 1997. *American Indian Languages. The Historical Linguistics of Native America*. New York, Oxford: Oxford University Press.
Clements, George N. 2000. Phonology. In *African Languages: An Introduction*, ed. by Bernd Heine and Derek Nurse. Cambridge: Cambridge University Press, 123-160.
Dahl, Otto Christian 1976. *Proto-Austronesian*. 2nd edition. Lund: Studentlitteratur.
Dixon, Robert M. W. 1980. *The Languages of Australia*. Cambridge: Cambridge University Press.
———— 1994. *Ergativity*. Cambridge: Cambridge University Press.
Fähnrich, Heinz 1994. *Grammatik der altgeorgischen Sprache*. Hamburg: Helmut Buske.
Foley, William A. 1986. *The Papuan Languages of New Guinea*. Cambridge: Cambridge University Press.

Fortescue, Michael 1984. *West Greenlandic*. (Croom Helm Descriptive Grammars.) London et al.: Croom Helm.

Gilley, Leoma G. 1992. *An Autosegmental Approach to Shilluk Phonology*. Arlington: Summer Institute of Linguistics.

Ho, Dah-An 1995. Paiwan. In *Comparative Austronesian Dictionary, Part I*, ed. by Darrell T. Tryon. Berlin, New York: Mouton de Gruyter, 307-314.

Holst, Jan Henrik 2001. *Lettische Grammatik*. Hamburg: Helmut Buske.

Kämpfe, Hans-Rainer and Alexander P. Volodin 1995. *Abriß der tschuktschischen Grammatik auf der Basis der Schriftsprache*. Wiesbaden: Harrassowitz.

Lass, Roger 1984. *Phonology. An Introduction to Basic Concepts*. Cambridge: Cambridge University Press.

Maddieson, Ian 1984. *Patterns of Sounds*. Cambridge: Cambridge University Press.

Newman, Paul 1980. The two r's in Hausa. *African Language Studies* 17: 77-87.

Nguyen, Dinh-Hoa 1987. Vietnamese. In *The World's Major Languages*, ed. by Bernard Comrie. New York: Oxford University Press, 777-796.

Orwin, Martin 1995. *Colloquial Somali. A Complete Language Course*. London, New York: Routledge.

Rottland, Franz 1981. Die nilotischen Sprachen. In *Die Sprachen Afrikas*, ed. by Bernd Heine, Thilo C. Schadeberg and Ekkehard Wolff. Hamburg: Helmut Buske, 267-277.

Ruhlen, Merritt 1976. *A Guide to the Languages of the World*. Stanford. (No publisher named.)

Schadeberg, Thilo C. 1981. Nilo-Saharanisch. In *Die Sprachen Afrikas*, ed. by Bernd Heine, Thilo C. Schadeberg and Ekkehard Wolff. Hamburg: Helmut Buske, 263-328.

_____ 1987. Zwei areale Sprachmerkmale im Ostsudan unter besonderer Berücksichtigung des Nera-bena. In *Leo Reinisch. Werk und Erbe*, ed. by Hans Mukarovsky. Wien: Verlag der österreichischen Akademie der Wissenschaften, 213-229.

Steever, Sanford B. (ed.). 1998. *The Dravidian Languages*. London: Routledge.

Suárez, Jorge A. 1983. *The Mesoamerican Indian Languages*. Cambridge: Cambridge University Press.

Wurm, Stephen 1982. *Papuan Languages of Oceania*. Tübingen: Gunter Narr.

Zvelebil, Kamil 1990. *Dravidian Linguistics. An Introduction*. Pondicherry: Institute of Linguistics and Culture.