words, and hence the two sounds must be classified as two separate phonemes. It is an interesting example of how semantic associations can bring about the emergence of a new phoneme once sufficiently divergent members already exist.

Type IV is limited to the extreme northern tip of Loudoun County, a German settlement having close relations with similar people adjoining them in the State of Maryland.

ˀa·ʊᵛ is used in all positions, a type of speech quite foreign to Virginia.

Type V is found in three distinct areas: (1) among the Quakers of Western Loudoun County and in the two northernmost counties west of the Blue Ridge; (2) in the Scotch-Irish settlement of Augusta, Rockbridge, Bath and Alleghany; (3) in the south-west Piedmont counties, Bedford, Campbell, Pittsylvania and Henry.

This type is like type I, except that the first principal member has lower tongue position ɐʊ, rather than ˂əu.

Type VI is found in the German settlements of Warren, Page, Shenandoah, Rockingham and north-west Highland counties. This area lies between the two northernmost counties west of the Blue Ridge and the Scotch-Irish counties, previously mentioned. This type is also found south of the Scotch-Irish communities in Botetourt, Roanoke and Floyd, and east of the Blue Ridge in the extreme south-west Piedmont counties, Franklin, Patrick.

The first principal member æʊ^ stands before voiceless sounds. The second principal member æ·ʊ stands before voiced sounds and in final position.

Type VII is found in the entire south-west mountain area of the State, lying west of the counties last mentioned.

æ·ʊ stands in all positions.

It should be noted in connexion with types V, VI and VII that old-fashioned speakers west of the Blue Ridge frequently tend to substitute for æʊ a sound closer to aʊ.

The comparative uniformity of speech within a given area seems to indicate that the approximate boundaries between different areas have been established for generations. Type V appears to be the result of the mingling in early days of types IV, VI and VII on the one hand with type I on the other. Aristocratic influences and settlers spread from Eastern Virginia into the two northernmost counties west of the Blue Ridge. Whether the Scotch-Irish communities preserve original speech conditions, or were simply more open to Virginian influences than the Germans, it is difficult to say. The south-west Piedmont was settled both by people from west of the Blue Ridge and by people from the east.

Type VI survives in areas more resistant to or more remote from Virginian influences.

Type IV remains thoroughly un-Virginian.

Type VII also appears to be a survival of original northern speech, remote from Virginian influences. There were, however, many later North Carolina settlers in this region.

It is interesting that the political boundary between Virginia and North Carolina on the south is not a speech boundary. North Carolinians, in general, employ type VII, except in the extreme east where type VI is found. However, the Virginian type of speech penetrates a very few miles south of the political boundary. People born in this section of North Carolina always say that they were born "on the line". Their speech, likewise, bears evidence that their cultural associations have been with Virginia.

An explanation of the difference between type I and type II, where practically all settlers are of seventeenth-century English stock, is a more difficult matter. One can assume that they result from the mixture of the dialects of various parts of seventeenth-century England.

Although the older counties, James City and Charles City, have been classified as belonging to type II, in reality they have certain special characteristics which make them appear ancestral to both. In slow or careful or emphatic speech a form ˀəu is likely to be substituted for the more rapid ˂əu. This variation does not exist in the section of type II on the Rappahannock which was settled about the middle of the seventeenth century or in the section south-west of the James which was occupied by gradual expansion from older settlements until about 1740 without many newcomers.

The portions of Tidewater which employ type I appear to be those which are rather remote from the early settlements on the James, and those which had many new settlers from England after 1660. These new settlers may have come from somewhat different parts of England, or the speech of England may have changed in two generations. These late seventeenth-century settlers were chiefly bondservants who were sold for four to seven years' labour, and thereafter given small holdings of their own. Although type I may have originated from people of a lower class, it is interesting to note that type I at the present time, perhaps on account of the growth of cities within its area, seems to be the most approved type of Virginia speech.

30. Dr A. N. Tucker (London): *The function of voice quality in the Nilotic languages.*

The languages I wish to discuss here are the Nilotic languages in the sudd area of the Southern Sudan—Shilluk, Dinka and Nuer. These tribes live for the most part in the swamps south and east of the junction of the White Nile and Sobat rivers, and to the west along the Bahr el Ghazal and adjoining rivers.

The Nilotic languages have a very complicated vowel and diphthong system, and it has so far been impossible to determine the principal vowel phonemes, as other factors, like length, intonation and voice quality, contribute to confuse the issue and are difficult to eliminate. I have recorded the following vowels, which I shall illustrate with examples from Bor Dinka:

i	alìik (*bat*)	a	na(k) (*feathers*)
ɪ	alɪk (*bats*)	ɒ	jɒk (*spirit*)
e	weel (*knives*)	ɔ	nɔk (*feather*)
ɛ	rɛɛr (*to stay*)	ʊ	kʊr (*hills*) (doubtful)
æ	wæl (*knife*)	u	kuur (*hill*)

but this analysis will probably afterwards be found too narrow.

Inflexion of words in the Nilotic languages is obtained in the following ways, but it must be remembered that the various processes mentioned below work together, and one is not used to the exclusion of another. I shall illustrate this with examples from Shilluk:

1. Variation in the final consonant of a word:
   ŋäc pl. ŋääθ (*back*)
2. Variation in musical pitch:
   lâì pl. lâì (*animal*) tɔ́ŋ pl. tɔ̀ŋ (*spear*)
3. Variation in the stem vowel:
   cɔɔgo pl. cuu (*bone*) bɛth pl. bithi (*fish-spear*)
4. Variation in the quality of the stem-vowel (i.e. centralized or non-centralized variety):
   nyaŋ pl. nyäŋ (*crocodile*)
   bat pl. bäät (*arm*)
5. Variation in length of the stem vowel or diphthong (there seem to be three degrees of length):
   waar pl. wär (*shoe*) cp. wă̈r (*night*) with extra short vowel.
6. Variation in the quality of the voice throughout the word—and it is this last element that I wish to discuss here.

There seem to be two main forms of voice production used. One demands a varying amount of pharyngeal contraction; this form of voice production has its European counterpart among certain speakers of North German. The other sort of voice is produced with open throat and something approaching whispered quality, though loud of course; I have heard this sort of voice, or something similar, among French speakers, especially when speaking depreciatingly.

It is hard to say which voice is normal for the Nilotic languages, but the impression I gathered was that the pharyngeal "squeezed" voice is the more commonly used. The "breathy" voice is rather intimately bound up in the phenomenon of centralization, in so far as centralized vowels seem normally to be accompanied by this form of voice quality. Non-centralized vowels, however, may be articulated with either "squeezed" or "breathy" voice.

In the following examples I shall show the function that this voice quality alternation has in the Nilotic languages, drawing my examples this time mostly from Eastern Nuer. It must be remembered that this form of alternation is only one method of inflexion, and that the same functions are carried out by all the forms of inflexion mentioned above. It is usual for two or three of these inflexion forms to operate simultaneously in a given paradigm, but no rules can be given, as each word has a different inflexional behaviour from its neighbour.

In the following examples "breathy" voice is indicated by the diacritic ˷ placed below the vowel. (This is the mark used in Crazzolara's *Nuer Grammar*. My examples do not always tally with his, as the dialect he describes is *Western* Nuer.) No diacritic is used for "squeezed" voice.

1. Differentiation of totally unrelated words:

màr (*relations*)	mar (*thunder*)	kèn (*they*)	kɛ̨n (*egrets*)
bɪl (*to taste*)	bɪ̀l (*blacksmith*)	kɛa (*divorced woman*)	
		kɛ̨a (*first-born*)	

Note also in the Rek dialect of Dinka:

rɒɒr ací lɔ roor. *The men have gone to the forest.*
kɔc kɒk ací kôk. *The rest of the people have left the district.*

2. Use in the inflexion of nouns:

lɛk pl. lɛ̨ɛ̨k (*fish—Nile perch*)	bɛ̨ɛ̨l pl. bɛl (*dura*)
kak pl. ka̱a̱k (*field*)	rɛ̨c pl. rèc (*fish*)
keer pl. kɛ́r (*gourd*)	rɪɪ̱ŋo pl. rɪŋo (*meat*)

and in Dinka:

ra̱a̱l pl. ràl (*sinew*)
wa̱l pl. wàl (*medicine*)

3. Use in the inflexion of verbs:

kàp (*put on head*)	ká̱p (sb.)
kɛt (*sing*)	kɛ́t (sb.)
yop (*take care of*)	yɒp (sb.)
rɪŋ (*run away*)	rɪɪ̱ŋ (*run towards*)
cá̋ je bɛ̀l. *I licked it* (trans.)	cá̋ bɛ̀l. *I licked* (intrans.)
cá̋ je dɔ̀m. *I caught it* (trans.)	cá̋ dɒm. *I caught* (intrans.)

and in Bor Dinka:

an ci áwa thà̱t. *I cooked for my father* (trans.).
àn ci thât. *I cooked for anybody* (quasi-intrans.).
apí. *He pushes it towards the speaker.*
apɪ̱́. *He pushes it away from the speaker.*

As regards the physiological aspect of these two forms of voice production, while I was in Hamburg last year Prof. Panconcelli Calzia examined and photographed my mouth and pharynx while I imitated these sounds. The most noticeable aspect of the "squeezed" voice was the pinching together of the pillars of the fauces and the lowering of the velum (without, however, allowing access to the nasal cavity). In the "breathy" voice the velum was raised, and the fauces furled back. The larynx was also lowered perceptibly. The result was an increased resonance cavity at the back of the mouth. I was unable to examine the glottis itself, but gather from subsequent investigation that its shape is as for whispered voice production.

These physiological data, however, count for very little, and must be regarded as giving only a vague idea of the actual process. Until one can obtain an actual Nilote, and then train his vocal organs to

withstand our apparatus, we shall not know the true nature of these voices.

But one thing stands out at this stage, viz. that voice quality alternation is as important a language aspect here as alternation in vowel quality or length or pitch, and that there should be a means of noting it, both in scientific works and, possibly, in everyday orthography for natives in schools.

31. Dr Z. M. Arend (Poznań): *The vowel-diaphonemes of Coptic.*

It is the task of the science of historical phonology to describe phonemes (strictly speaking diaphonemes), to trace lines of chronological continuance and to ascertain phonetic changes in the phonemes described. The most interesting of these changes are those involving the bifurcation of any one phoneme of a given language at an earlier stage of its history into two phonemes existing at a later date, or, vice versa, the gradual convergence and eventual fusion of two phonemes into one. Certain phenomena of the latter sort have recently been observed and analysed in Ancient Egyptian and Coptic by Prof. Śmieszek, of the University of Warsaw. The results of his researches into the phonematic distribution and redistribution of the Egyptian and Coptic vowel-sounds are embodied in his work, *Notes on the Presumable Vowel System of Primitive Egyptian and its Coptic Reflexes*. Having had the honour of translating that work into English, I have requested and obtained the author's permission to make his discoveries the subject of a paper to be read to the Second International Congress of Phonetic Sciences. The present paper is duly authorized by Prof. Śmieszek, and the phonological theory outlined in it is developed more at length in his aforesaid work, which is to be published shortly by the Polish Academy of Sciences. My own contribution to this paper does not extend beyond the necessary work of abridging, summarizing, and presenting the subject-matter in its phonetic aspect, including the use of the International phonetic alphabet.

The vocalization of weakly stressed and unstressed syllables is fairly simple. According to Prof. Śmieszek's theory of Egypto-Semitic accentuation, the accent was in those languages prominently dynamic, expiratory. In every polysyllabic word of the parent language the secondary stresses were separated from one another and from the main stress by one unstressed syllable. Hence, in Pre-Egyptian, the accentual scheme of a word of four syllables was like this:

ˊ ˘ ˋ ˘

Somewhat later the unstressed vowels dropped out. The vowels bearing secondary stress in the Pre-Egyptian period became then unstressed and were levelled under one neutral vowel-diaphoneme, which appears in the two southern dialects of Coptic (S., or Sahidic, and A., or Akhmimic) as ə, and in the two northern dialects (B., or Bohairic, and F., or Fayyumic) as ɪ, when final. The treatment of

Pre-Egyptian weakly stressed and unstressed vowels is seen in the Pre-Egyptian feminine

*ˈnɑfɪˌrɑtʊ "bona"
>*ˈnɒfrət
>S. *nofre* || B. *nofri* (=nɔfrə, nɔfrɪ).

The history of the Egyptian and Coptic *stressed* vowels is much more varied. When studying these vowels, we are handicapped at the outset by the complete absence of vowel-symbols in the Egyptian writing. It is only towards the end of its long history, in the Coptic era, that the Egyptian language emerges in fully vocalized texts written in the Greek alphabet. In his attempts, therefore, to ascertain the more ancient stages of the chronological evolution of the Egyptian vowel-phonemes, Prof. Śmieszek had to fall back upon records written outside Egypt. Such remnants are extant in the fairly numerous Egyptian words occurring in Babylonian cuneiform texts of the fourteenth century B.C., in Assyrian cuneiform texts of the seventh century B.C., in the Hebrew Bible, and in the historical literature of the Greeks.

Taking for granted that Egyptian and Semitic are cognate languages, and that there must have been some prehistorical period when both Parent Semitic and Pre-Egyptian branched off from a common parent tongue, Prof. Śmieszek starts from the hypothetical vowel-system of Parent Semitic. Comparative Semitic philology assumes for the parent language a triangular vowel-system, like this:

*i(ː) *u(ː)
*a(ː)

This is the vowel-scheme assigned by scholars to Parent Semitic, and at the same time also to Pre-Egyptian. In the latter language, however, two peculiar tendencies affecting the vowels of stressed syllables made themselves felt at an early period, differentiating the Egyptian and Semitic vowel-systems.

The first of these tendencies may be described as a trend towards retracted tongue-position in the open vowel-phoneme *a(ː), which accordingly became *ɑ(ː), or, with open lip-rounding, *ɒ(ː).

The second peculiarity of the Egyptian vowel-system was a tendency to make the short vowels more open than the corresponding long ones, and, vice versa, the long vowels closer than their short counterparts.

Owing to the working of these tendencies, the triangular vowel-scheme common to Parent Semitic and Pre-Egyptian was modified in Egyptian as shown in the following diagram:

*iː *uː
*ɪ *ʊ
*ɔː
*ɑ(*ɒ)

The symmetry of the original phonematic scheme was now disturbed, the back vowels being twice as numerous as the front vowels. The language got rid of this superabundance of back vowels by a