

unit, generally the syntagmateme. The constituents — in plerematics: the *pleremes*, in cenematics: the *cenemes* — are usually of two types: central and marginal constituents. The central pleremes are the elements known as radical, the marginal pleremes are the elements known as derivational. A minimal unit consisting of central cenemes is called a *vowel*; a minimal unit consisting of marginal cenemes is called a *consonant*. The central constituents are defined as constituents of which one minimal unit may be the only constituent of a syntagmateme.

The striking parallelism in the structure of the two planes, the plane of content and the plane of expression, highly corroborates the internal value of my definition of the syllable.

This whole deductive theory of plerematics and cenematics, established by Mr. UL DALL and myself under the common name of *glossematics* (1), bases the definitions of forms on their function among themselves. The syllable, the vowel, and the consonant are functional form units and can only be defined as such. But to the description of the pure forms can be added a description of the substances formed by them: a description of the meaning and of the pronunciation, the writing, etc. The substances again are defined by their function to the forms, and can only be described correctly by a deduction from the forms. If phonetics has not as yet succeeded in giving a consistent definition of the syllable, the vowel, and the consonant, the reason is that these units have been conceived as pure sound units. They are sound units and form units at the same time, and they are only sound units because they are form units. The phonetic and the graphic syllable must be defined as manifestations of the cenematic syllable, in those languages where the cenematic syllable is realized in the form system.

40. Mr. H. J. UL DALL (Vedbæk): *On the Structural Interpretation of Diphthongs*.

It is with diphthongs as it is with a good many other concepts in our trade: everybody knows what it is, but so far no definition has been found that will ensure a purely objective decision in each concrete case and eliminate personal opinion. Perhaps the current views can be summed up in the following statement: a diphthong is a vocalic continuum of composite quality comprised within one syllable. Some of the difficulties encountered

(1) See LOUIS HJELMSLEV and H. J. UL DALL, „An Outline of Glossematics”, in *Humanistisk Samfundskrifter*, I (Aarhus-Copenhagen-London, 1939) (in preparation).

are due to imperfect definition of the syllable, others to imperfect definition of the vowel, and still others to the vagueness of the definition of the diphthong itself.

Dangers lurk in the path of phonetician and phonologist alike. The phonetician's trouble is to know exactly how far a vowel is to be allowed to swerve from the straight path of uniform quality before it should be called a diphthong. This is necessarily a matter of taste, and the result of the inquiry is therefore of no particular interest from a scientific point of view.

The phonologist, in his turn, is faced with the question whether a given diphthong — recognized as such by some means or other, is to be interpreted as a realization of one phoneme or of two phonemes. That the methods of phonology lead to no less ambiguous results than those of phonetics, is amply demonstrated in the literature on the subject (1).

Altogether, then, the diphthong remains a puzzle — a sorry state to be in for a branch of knowledge which calls itself not only a science but several sciences. Scientific in the proper sense of the word our studies will never be, until we adopt the deductive method, based on a set of unambiguous definitions, and criteria that allow of only one interpretation of any given phenomenon.

It is the purpose of this paper to sketch a solution of the problem of diphthongs along those lines.

Going on from the definitions given by Professor HJELMSLEV in his paper, we can define a diphthong as a duplex central group, or, in other words, the central unit of a syllable is said to be a diphthong when it consists of a group of two vowels. A definition which is equally valid whatever the substance chosen for the manifestation of the system of expression, since it is deduced from purely functional definitions of the syllable and the vowel.

The diphthong is thus only a special case of grouping in general: it must be established by the same kind of function which establishes other groups, such as the consonant groups which occur in marginal units, and the groups of accents mentioned by Prof. HJELMSLEV. The ability to occur in such a group is, of course, an important part of the functional definition of each component vowel; we shall return to this question later.

The number and identity of the vowels in a given group is

(1) Cf. particularly J. VACHEK, „Ueber die phonologische Interpretation der Diphthonge” (*Práce z vědeckých ústavů XXXIII*, Filosof. Fakulty, Prague, 1933).

determined by the test of exchangeability, as previously explained. In the procedure which we have devised, this analysis takes place in the syntagmatic deduction, long before the recognition of the syllable, but there is not time to go through all the proper stages in a paper like this. The guiding principle here, as in all scientific work, must be to give the simplest possible explanation of the phenomena observed, i. e. an explanation by reference to the smallest possible number of elements. In order to obtain an inventory of as few elements as possible, it is necessary to adopt the principle of recognizing as many elements as possible in the chain, and we have here the answer to the question which has occupied the phonologists: the interpretation of any given central group is correct, if it recognizes as many vowels as permitted by the material and as consistent with the theory adopted. The application of this criterion leaves no room for doubt or discussion as to the monophonemic or biphonemic nature of any given central unit.

If we examine, now, the kinds of groups that answer to our definition of a diphthong, we shall find that there are two, viz. groups consisting of two different vowels, and groups consisting of two identical vowels. It will be seen that if a language has diphthongs of the type *ai* and also long vowels such as *i:*, it is possible to interpret the long vowels as manifestations of groups of two identical short vowels, and so to avoid the necessity of postulating an extra set of phonemes for the long vowels: if we replace the first part of the diphthong in the English syllable *hart* by the short *i*, we get *hɪrt*, which can be identified with *hɪrt* because the exchange of the two is not accompanied by a corresponding difference of content. The difference in quality is due to a peculiarity of English usage: the closer phone is a function of the vowel *i* in identity groups, while the more open phone is a function of *i* in simplex units and in all other complex units.

Because of the inclusion of identity groups, we might find it better to revise the definition so as to cover only groups of two different vowels. But even so it will be found that units which can be manifested in a phone of uniform quality, must sometimes be structurally interpreted as diphthongs. This is clearly illustrated by the long vowels in Danish; thus the first long vowel of *pø: n mɔ:ðə* „in a way”, is to be interpreted as consisting of *ɔ + e*: *pɔ en*, the diphthong being due to the latency of the accent of the second syllable.

It is not surprising that a purely functional method should lead to results that differ from those obtained by physical, physiological, or psychological methods. We have already seen that what is or may be a physical monophthong, must sometimes

be interpreted as a manifestation of a structural diphthong, but the opposite case is also possible: a phone of composite quality may very well be a function of a structurally indivisible unit or of an identity group: the question whether the substance is uniform or not, has no bearing whatever on the structural interpretation, and the deductive linguist is therefore spared the arbitrary choice which is the lot of the inductive phonetician.

A phone of composite quality may further be the manifestation of a vowel plus a consonant or of an even more complex unit. This is the case with the English glide *ɪə*, which can be regarded as a manifestation of *i + r*, cp. the different manifestation before a vowel: *hɪər* and *ðɛə*. A particularly clear example is furnished by a number of phones in Maidu, such as *ai*, *ɔi*, *au*. That the second part of such composite phones is the manifestation of a consonant and not of a vowel, is shown by its function: between certain suffixes and a stem ending in a consonant, a connective vowel, usually *i*, is inserted: *sɔl* „sing”, *sɔl-i-bɛ mi* „are you singing?”, while a stem ending in a vowel gets no *i* before the suffix: *mɔ* „drink”, *mɔ-bɛ mi* „are you drinking?”. After stems ending in units like *ai*, *ɔi*, *au*, the *i* is inserted: *uk'ɔj* „go”, *uk'ɔj-i-bɛ mi* „are you going?”, which proves that we have no diphthong here but a unit consisting of vowel plus consonant. Under certain conditions the accent of the syllable which includes the connective *i*, may become latent, and the whole chain of vowel plus consonant plus vowel is then pronounced as one monosyllabic glide: *uk'ɔim ni* = *uk'ɔj-i-m ni* „I am going”. Similarly Danish *nu: də sɔmɔə* „now it is summer”, where the long vowel is a manifestation of *u + ε + r*: *nu er*, with latency of the second accent.

A central unit may consist of more than two vowels: triphthongs and possibly polyphthongs of even greater complexity, but although a study of such more complex units is a necessary part of the description of a language in which they occur, it will add nothing new to the functional definition of the component vowels, because of the empirical law of complex groups formulated by Prof. HJELMSLÆV at the Congress in London (1): a group of more than two never includes combinations that do not also occur in groups of two in the same language. Thus if a language has the triphthong *ɛia*, it also has the diphthongs *ɛi* and *ia*. In consequence of this law, the syntagmatic part of the definition of vowels need take into consideration only their function 1° as the first component of a diphthong, 2° as the

(1) Cf. *Proceedings*, p. 53.

second component, and 3° as the only component of a central unit (1).

I should have liked to discuss two things more : the possibility of a functional definition of falling and rising diphthongs, and the further analysis of vowels into central cenemes, but it would take too long, particularly the falling and rising diphthongs, which would necessitate a long excursion into the theory of accentual units.

Let me say in conclusion that our attempt, in these two papers, to indicate a deductive and unambiguous method has been inspired by no theological belief that our particular approach is the only possible or even the only desirable one. On the contrary : the functional study of the cenematic system must be supplemented by a physical, a physiological, and a psychological study of the sound pattern. What we would urge upon your consideration is that all efforts should be coördinated and should be based upon and subjected to the mother-science of Linguistics.

#### 41. Mr. PAUL ARISTE (Tartu) : *A Quantitative Language.*

One part of the Fenno-Ugric languages is worthy of attention for the reason that it possesses its own well-developed quantitative system. By this is meant the Balto-Finn languages (Finnish, Votic, Estonian and Livonian) and the Lapp dialects. The last especially, and, of the Balto-Finn group, the Estonian language are of such a character that they can be called typical quantitative languages, that is, languages where the quantity of the sounds in relation to other phonetic characteristic occupies a central position. In the following short survey it is intended to consider the Estonian language, and in the summary to present the quantitative relations of this language and to show how a great part of the pronunciation system of the language depends on quantity.

In most languages known to phonetic literature the quantitative relations are very simple. Generally a short consonant follows a long vowel, and a short vowel is followed by a long consonant or a group of consonants. At the same time the length of the sounds depends on the stress. In the Estonian language the possibilities of combining short and long sounds are extens-

(1) I am purposely leaving out in this paper the occurrence of vowels in marginal units, such as Danish *kuŕv* = 'ghuru' „basket". For a treatment of this function see L. HJELMSLEV and H. J. ULDALL : *An Outline of Glossematics, Humanistisk Samfunds Skrifter I* (Aarhus-Copenhagen-London, 1939).

ive. The fact that this language possesses more than two degrees of length makes the abundance of quantitative groups still greater. Glottologically there exist three lengths — short, long and extra long, for example : „sada" hundred, „saada" send, „saada" to get ; „kabi" (*b* is a short voiceless *p*) hoof, „kapi" gen. sing. wardrobe, „kappi" part. sing. wardrobe, or „kafi" small beer, „kallis" nom. sing. dear, „kalli" gen. sing. dear. The length of a short vowel is about 10, of a long about 25 and of a extra long about 35 in hundredth of seconds. The three degrees of length of the consonants are more or less of the same extent. The smallest error in one of the abovementioned lengths may lead to a misunderstanding, or may even make what has been said unintelligible. So, even phonologically (according to the ideas of the Troubetzkoy school) there are three important vowel and consonant lengths in the Estonian language. Besides these three lengths, there are still other degrees in Estonian, which glottologically are not of the same importance as the aforementioned, but which are postulated by correct pronunciation and from which depend important phonetic relations. First of all there should be mentioned the half-length sound, *inter alia* the half long vowel of the second syllable : „sadà" hundred, and the one-and-a-half length vowel which is between the long and the extra long vowel, „saata" to send. The length of these vowels in hundredths of seconds is about 15 and 30. So, really, there are in Estonian at least 5 important degrees of length which cannot be ignored in any way. In addition there are 4 more combinatory degrees of length of lesser importance, so that in this survey they can be passed over in silence.

In the first syllable, on which the principal stress falls, all the different degrees of length of both vowel and consonants may appear with one another in almost every possible combination, for instance, a short vowel and a short consonant („kala", fish) ; a long vowel and a short consonant („tooli", gen. sing. chair) ; a one-and-a-half-length vowel and a long consonant („kooki", part. sing. cake : the word is pronounced „kook + ki") ; a long vowel and a short consonant („vaapsik", hornet) ; an extra long vowel and a short consonant union („koolgi", even the school) ; a one-and-a-half-length vowel and a long consonant union („viitsima", to care to), etc. From the last examples it is evident that not only the single sounds have several degrees of length, but that the sounds unions have them too. Every consonant union may be longer or shorter quantitatively and the diphthongs too have two degrees of quantity, for example : „laulma" to sing, with a diphthong where *u* is long, and „laulan" I sing, with a diphthong where *u* is short. Further from the main stress, the quantitative relations are simpler, although in the