Of no less interest are also the articles attempting to solve specific questions: Oral Styles of American Folk Narrators by Richard M. Dorson;[2] Phonological Aspects of Style: Some English Sonnets by Dell H. Hymes; Nominal and Verbal Style by Rulon Wells (an attempt to evaluate nominality which, in my opinion, does not lay sufficient stress upon the functional point of view); Decoding a Text: Levels and Aspects in a Cheremis Sonnet by Thomas A. Sebeok (who was editor of the book); Variant Readings and Misreadings by I. A. Richards; The Pronouns of Power and Solidarity by Roger Brown and Albert Gilman (an acute semantic study; we should add, however, that the area covered by the use of the 2nd person pronoun *(thou-ty)* also includes its occurrence in utterances in which the expression of social relationship is negligible; accordingly, we use *thou* in Czech when addressing, for example, children, animals and, in our thoughts, all sorts of people). Five papers are devoted to metrics and three to psychological approaches to the problem of style.

In my opinion, the importance of the book may above all be seen in the fact that the authors of the papers tried to adopt a modern, exact, almost unidealistic approach towards the question of literature and its style (linguistic in particular, but also literary). Although the book does not bring any "definite", generally recognized solution as to the nature of style in literature and the methods of analysing style, and although the scholars from various fields of research have not reached agreement in establishing a common language, there are, after all, some problems explained in quite a new way, and looking back after a period of time it is possible to say that many premises stated at the conference and published in the book have in the meantime won universal acceptance.[3] Two features of the book are particularly striking. First, the willingness to work with new concepts and methods of the theory of information seems to be greater among linguists rather than among literary critics. Secondly, and this will please the Czech reader especially, some of the papers manifest their adherence to the scholarly heritage of the pre-war Prague Group, Jakobson's in the first place. The reader will then certainly notice the lively explanatory style of the papers, their clearness, wittiness, respect for the audience, prompt reactions of the speakers—things that are not quite common in our discussions. A book containing the papers of a conference should in fact retain its vivid, spoken character, which is something we sometimes forget about.

Jan Chloupek

Zellig S. Harris: **String Analysis of Sentence Structure**, Mouton & Co., The Hague 1962, pp. 70.

1.

Z. S. Harris's monograph opens a new series, entitled **Papers on formal linguistics**, to be published by Mouton & Co. of the Hague. The series will bring studies concerning various spheres of linguistic research and employing formal methods.

Harris's monograph is a revised version of Computable Syntactic Analysis, No. 15 (1959) of Transformations and Discourse Analysis Papers, a mimeographed series which publishes the results of the research carried out, with the help of automatic computers, by the Department of Linguistics, University of Pensylvania.

2.

Harris first defines the concepts of **sentence** and **utterance**. Sentences are characterized by him as "those segments of speech (or writing) over which certain intonations occur or within which certain structures occur", a particular structure being a particular combination of classes of elements. Utterances are described by him as sequences or fragments of sentences. He does not, however, explicitly state whether the sentence is a unit of a system, i.e. of language, or the utterance a unit of the text, either written or spoken.

Empirically decomposing any set of utterances, we cannot obtain all the sentences of the language, i.e. the set of all the sentences of the language. We may, however, group the words into classes. Provided we know the regularities shown by the combinations of these classes, we can say that the sentences found in an utterance are combinations of particular members of these classes and that the same combinations of other members of these classes will also be accepted by native speakers as being sentences. A grammar of a language endeavours to show that all sentences accepted by native speakers can be characterized as particular types of combinations of particular classes of elements (phonemes, morphemes, words, sentences).

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[3] Compare, among the latest books, L. Doležel: Stylistika jako experimentální věda? (Slovo a slovesnost 24 (1963), pp. 64—67].

3. String Analysis (SA)

SA breaks up a sentence into one elementary sentence (its centre) and elementary adjuncts, i.e. word-sequences of particular structure which are not themselves sentences and which are adjoined immediately to the right or to the left of an elementary sentence or adjunct. An elementary sentence or adjunct is a string of words; the words are its succesive segments. According to its affixes or its position in the sentence or adjunct, each word is referred to one or more word-categories. In consequence, each word of a string can be replaced by the symbol of its category, the symbols forming a string of category-symbols, i.e. a string formula, a symbolic representation of the word-string in question.

It is, however, necessary to know how the strings are established, i.e. how to tell the elementary sentence from the adjuncts. Any sentence S is regarded as a sequence of morphological word-categories. By succesively excising its parts until what remains is still an accepted sentence, we arrive at the elementary sentence S_0. There are often several ways of isolating S_0, the resultant S_0's not being necessarily the same. For one formulaic representation, however, only one way is suitable, the isolated S_0 having the same properties of occurrence as S, i.e. those of a sentence. We may proceed further. From each of the excised sequences, Z_i, we may seek to isolate the elementary part Z_{i_0} and the Z_i parts. Z_{i_0} will have the same properties of occurence as Z_i. But how do we know whether the remainder of S is still a sentence or not? As is usual in American descriptive linguistics, to find out about this, Harris turns to informants; they are to decide. In this way, it is possible to draw up a list of elementary strings and the adjoinable adjuncts.

It follows that with the help of several classes of strings and simple rules describing their mutual relations of occurrence, SA endeavours to characterize all the sentence of a language.

4. A Comparison of the Three Analyses

According to constituent analysis (CA), the sentence is decomposed into components at lower descriptive levels. Every sentence consists of a sequence of constituents, each of which is a sequence of constituents at a lower level. Decomposition continues until the final constituents, i.e. the morphemes are reached. CA is considered satisfactory if only a few and not very variegated classes of constituents and rules of decomposition suffice to characterize all the sentences of the language.

Transformational analysis (TA) decomposes every sentence, without residue, into elementary sentences, which are not necessarily identical with the elementary sentences established by SA. Elementary sentences established by TA occasionally carry primitive adjuncts, i.e. adjuncts not derived from sentences. Elementary sentences and primitive adjuncts are operated upon by binary or a unary transformations.

It is evident that SA is itermediate between the other two. CA decomposes the sentence into constituents, i.e. non-sentences; SA decomposes it into one elementary sentence and the adjuncts adjoined to it. According to Harris, TA reduces the whole sentence to elementary sentences (with primitive adjuncts) and constants, i.e. operators added to the sentences in the course of transforming them. Harris thinks that each of the three analyses can be worked out independently of the other two; all of them, of course, will have to make use of some results of morphology.

According to Harris all the three analyses are equally powerful, i.e. they do not differ in the power to describe all the sentences of the language; they differ only in complexity of the description. Such a statement, however, does not seem to be quite exact. It is possible to compare the powers of various grammars[1], but not the powers of various types of syntactical analyses, if it is not clear what grammar the given type of analysis is to be referred to. If CA can be referred to phrase-structure grammar, no exact mathematical description of transformational grammar can be offered. (The same necessarily holds good for TA as well.) It is assumed that phrase-structure grammar (CA) delimits the same set of sentences as transformational grammar (TA) does; to our knowledge, however, no proof of this statement has so far been offered. Still less is known about the relation of SA to the other types of analyses, for—as far as we know—no mathematical description of SA has been carried out yet. Harris's statements are therefore to be regarded as intuitive estimates, the validity of which will have to be mathematically proved.

Harris further states that TA makes it possible to offer a more economical description of sentence structure, in this respect differing from the other analyses. From the linguistic point of view, TA goes beyond SA or CA in that it establishes relations between sentences about which we feel that they should be brought together. TA reconstructs component sentences through transforming

[1] For a detailed discussion, see B. Palek, Informace o transformační gramatice (Information on Transformational Grammar), Slovo a slovesnost, 24, (1963) pp. 145—151.

segments, i.e. through indicating sentence relations between the word categories of a segments; e.g., "Entering the house" may be transferred into "He entered the house". It is to be noted that Harris does not pay due regard to the results achieved by his pupil N. Chomsky[2].

5. Axiomatic String Theory

In this part of his monograph Harris defines the system of string formulas and the rules for combining them. It is possible to derive from the string formulas word sequences exactly as they occur in the sentences of the language, and vice versa, by way of identification, the sentences of the language yield the string formulas. A string formula is regarded as a sequence of segments consisting of stated word-categories, sub-categories or disjunction of categories; every string formula has particular properties of occurrence: it occurs independently, or to the right or left of a particular category or string formula.

The list of strings contains eight elementary or central strings, which represent the basic English sentence types, denoted by $c_1, \ldots, c_8$. These eight types may be briefly characterized as follows.

c_1 — the type: subject—predicate—object, which yields the most frequented and truly basic sentence formula;

c_2 — the string formula of the interrogative sentence, e.g. Will he come?, etc.;

c_3 — the string formula of the imperative sentence, e.g. Go home!, Wash yourself!, etc.;

c_4 — the string formula of the sentences with contrastive stress;

c_5 — the string formula of sentences with the anticipatory subject, e.g. It seems that he did it., etc.;

c_6 — the string formula of the existential sentence type, e.g. There is a man., etc.;

c_7 — the string formula of the sentence type of Nearby sat a sailor.;

c_8 — the string formula of the sentence type of Him we restrained from going.; etc.

The list further contains adjunct strings of various kind, i.e. prepositional, adverbial, adjectival, adnominal, sentential adjuncts as well as the so-called x-adjuncts, with the help of which and the symbol K it is possible to define the co-ordination of strings, or according to Harris the conjunction of strings and the comparative conjunction. K is in fact an operator acquiring the values of and, but, rather than, etc.

6. The Rules concerning the Derivation of Strings

The rules, the definitions of which are based on the list of strings, represent the second part of the axiomatic string theory and describe how adjoinable strings can be adjoined to the elementary string, i.e. to the central type c_1. The list of strings states the properties of occurrence characteristic of the string formulas and makes it possible to decompose the sentence into strings, which are present in it. This means that recognition of string structure of the sentence is carried out in regard to the given string list. Harris, however, does not maintain that by decomposing the sentence into strings we can establish all its properties.

7. The Recognition of Strings and String Formulas

The recognition process begins by assigning each string of words to a string of word-categories, i.e. in the last instance to one of the string formulas given by the list of strings. And there is another very important aspect of the recognition process: it has to be ascertained whether the sentences are well formed. In decomposing a sentence we try to establish a complete centre sequence c_1, or, in its absence, one of the other c_i. This means that we are comparing the string formulas yielded by the sentence with the formulas given by the string list which show properties of occurrence admitting, at a certain point in the sentence, a particular word-category or sequence of categories. To do this, we may have to know the neighbours, and (in some cases) at what point in the sentence structure we are. The fact that after the decomposition of the sentence there is no adjunct left means that the sentence is well formed. The results of decomposition simultaneously indicate which string constitutes the centre of the sentence and which strings are adjoined to the various parts of the sentence. All this information is very useful, for all the categories to which the requirement of well-formedness applies are mutually related. Words that take up various positions in the sentence structure differ in semantic properties.

[2] N. Chomsky, Three Models for the Description of Language, IRE Transactions on Information Theory, IT 2, 1956; Syntactic Structures, 's Gravenhague 1957;

N. Chomsky—G. A. Miller, Introduction to the Formal Analysis of Natural Languages, 1962, rotaprint.

8. A Programme for the Computer (Univac)

As the SA is a formal procedure, it can be expressed in the form of an algorithm and utilized in a programme for a computer; this has been demonstrated on the computer Univac. The list of strings remains unaltered, only minor modifications proving necessary; e.g. the strings are divided into two sets: 1. first-order, which do not contain the verb-plus-object sequences, and 2. second-order, which do. The recognizer may meet with difficulties caused by the dictionary (if a given word is a member of more than one category) or by grammar (if the rules are applicable in more than one way, i.e. in cases of syntactic homonymy). The computer eliminates syntactic homonymy by applying a number of special tests.

In 1959, this programme was put to the test, computer Univac being used for this purpose. The computer recognized all English sentences of the type c_1. The programme did not cover the identification of idiomatic strings. In the autor's opinion, however, they could be easily fitted into the programme.

It is interesting to note that Harris thinks that the recognition of first-order strings and some of the second-order strings can be effected by a finite state device. The recognition of the other strings of second-order can be effected only by a more powerful device, i.e. by an automaton with erasure and cycling or an automaton with a counter. All this, however, has not been mathematically proved. To prove the validity of these statements is one of the tasks to be taken up by the theory of grammar and the theory of automatons.

9. Conclusions

The SA put forth by Harris is a part of grammar of a language (English) which carries out a syntactic analysis of sentences, but also admits their generation by means of an axiomatic string generator; the purpose of such a generator is served by the described axiomatic string list and dictionary of morphemes. From the linguistic point of view, SA is a syntactic analysis based on the properties displayed by the occurrence of word-categories; the properties of occurence determine the place and character of syntactic categories. This procedure seems to be very suitable for English, for it is based in its grammaticized word-order; the question, however, arises as to its applicability to Slavonic languages, e.g. Czech or Russian. Like other analyses, SA does not make use of the concept of grammatical dependence. It is evident, however, that out of all the other types of analyses, Harris's string analysis comes nearest to dependency grammars[3]. SA is based on the asymmetric relation of the elementary string and the adjoined string (to the right or to the left); similarly dependency grammars are based on the asymmetric relation of the governing and the governed element. The peculiarity of SA is that it is built up on word-order: it is the position of the word that determines in the end what syntactic category the word is to be assigned to. Dependency grammar establishes the interdependence of two words, as a rule not paying attention to their positions. Although the inquiry into word order in the proper sense of the word was not its aim, Harris's monograph is also an interesting and valuable contribution to this sphere of study.

It would be usefull if the statements on the properties of occurrence of the string formulas were accompanied by those on their statistical characteristics. It should be added that what Harris regards as an axiomatic string theory is in fact an axiomatic theory with some rules of probability character. Harris himself admits that his axiomatic theory reckons with exceptions.

Further development will show what position Harris's SA will take up within the context of contemporary algebraic linguistics. It seems that he has intentionally gone his own way as if at any cost he wanted to attempt a grammar quite original in its conception. To a considerable extent, his attempt has been succesful.

Karel Pala

A. N. Gvozdev: **Вопросы изучения детской речи.** Moskva 1961, s. 472.

L'étude du langage enfantin n'est pas un sujet tout neuf, sa tradition date de la fin du siècle passé. Mais, après un grand essor du travail dans ce domaine, où c'étaient surtout les psychologues, les médecins et les pédagogues qui s'y appliquaient, il semblait que le sujet avait été déjà suffisamment traité et exploité. Cependant, dans les dernières dizaines d'années, l'intérêt à ces études réapparaît, après la publication d'une série des oeuvres consacrées

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3. P. Novák, Některé otázky syntaktické analýzy (z hlediska SP) (Some questions of syntactic analysis — in regard to machine translation), Slovo a slovesnost, 23, (1962), pp. 9—20.