[*Mechanical Translation*, Vol.7, no.2, August 1963]

Abstracts of Papers for the 1963 Annual Meeting of the Association for Machine Translation and Computational Linguistics

Denver, Colorado, August 25 and 26, 1963

Necessity of Introducing Some Information Provided by Transformational Analysis into MT Algorithms

Irena Bellert

Department of English Philology, Warsaw University

A few examples of ambiguous English constructions and their Polish equivalents are discussed in terms of the correlation between their respective phrase-marker representations and transformational analyses. It is shown by these examples that such an investigation can reveal interesting facts for MT, and therefore should be carried out for any pair of languages for which a given MT program is being constructed.

If the phrase-marker of the English construction is set into one-to-one correspondence with the phrase-marker of the Polish equivalent construction, whatever particular transformational analysis of this construction is to be taken into account, then the ambiguous phrase-marker representation can be used as a syntactical model for MT algorithms with good results.

If the phrase-marker of the English construction is set into one-to-many correspondence with the phrase-markers of the Polish equivalents, according to the transformational analyses of this construction, then the ambiguous phrase-structure representation has to be resolved in terms of transformational analysis, for only then is it possible to assign the corresponding phrase structure representation to the Polish equivalents.

A tentative scheme of syntactical recognition is provided for the multiply ambiguous adjectival construction in English[1] (which proved to belong to the latter case) by means of introducing some information obtained from the transformational analysis of this construction.

The Use of a Random Access Device for Dictionary Lookup

Robert S. Betz and Walter Hoffman

Wayne State University

The purpose of this paper will be to present a scheme to locate for single textual items and idioms in textual order their corresponding dictionary entries stored in an IBM 1301 random access mechanism.

Textual items are considered to be 24 characters in length (left justified with following blanks). A dictionary entry consists of a 24 character Russian form, grammar information for the form and a set of translations for that form. Dictionary entries are packed into sequential tracks of the 1301. This paper will cover the method used for dictionary storage.

The lookup for a textual item I first consists of a search for the first track that the dictionary entry E (if one exists) for I could be stored in. Once a track has been determined its contents are searched in core by a bisection convergence technique to find E. If E cannot be found, a "no entry" indication is made.

If E is found a further search is made of the dictionary to find the longest sequence of text, starting with the first item I, that has a dictionary entry. The last such entry found is picked up.

Included in the presentation will be examples of the dictionary lookup output for actual text.

1 cf. the paper by Robert B. Lees, "A Multiply Ambiguous Adjectival Construction in English", Language 36(1960).

Generative Processes for Russian Impersonal Sentences

C. G. Borkowski and L. R. Micklesen

IBM Thomas J. Watson Research Center

Impersonal sentences of Russian are those traditionally construed to consist of predicates only. Ever since the first Russian grammar was compiled, they have continued to pose a problem for grammarians. This paper is intended to be a review and evaluation of all types of the so-called impersonal sentences in the Russian language. The investigation of these sentences has been conducted in terms of their relationships to basic (kernel) sentences. Our paper attempts to define the origin for such impersonal sentences, i.e., how such sentences might be derived within the framework of a generative grammar from a set of rules possessing maximal simplicity and maximal generative power. The long-range aim of this investigation involves the most efficient manipulation of such sentences in a recognition device for Russian-English MT.

Concerning the Role of Sub-Grammars in Machine Translation

Joyce M. Brady and William B. Estes

Linguistics Research Center, The University of Texas

The comprehensive grammars being developed at the Linguistics Research Center of the University of Texas will be too large for easy access and manipulation in either experimental programs or practical translation. It is necessary, therefore, to devise some reliable method for selecting subsets of the grammar rules which will be reasonably adequate for a given purpose. Since

the majority of the rules are dictionary rules, this problem is closely related both to the problem of constructing microglossaries and to the subsequent problem of choosing a particular microglossary suitable to a given text.

Our current approach to this problem entails the construction of key word lists in the first stage of analysis which guide the computer in its choice of a previously constructed microglossary. Work to date indicates adaptations of this technique may not only contribute to the solution of storage and access problems but also facilitate analysis and simplify problems of semantic resolution.

Word-Meaning and Sentence-Meaning*

Elinor K. Charney

Research Laboratory of Electronics, Massachusetts Institute of Technology

A theory of semantics is presented which (1) defines the meanings of the most frequently occurring semantic morphemes ('all', 'unless', 'only', 'if', 'not', etc.), (2) explains their role, as semantically interdependent structural-constants, in giving rise to sentence-meanings, (3) suggests a possible approach to a sentence-by-sentence recognition program, and (4) offers a feasible method of coordinating among different language systems synonymous sentences whose grammatical features and structural-constants do not bear a one-to-one correspondence to one another. The theory applies only to morphemes that function as structural-constants and their interlocking relationships, denotative terms being treated as variables whose ranges alone have structural significance in sentence-meaning. The basic views underlying the theory are: In any given sentence, it is the particular configuration of structural-constants in combination with specific grammatical features which produces the sentence-meaning; the defined meaning of each individual structural-constant remains constant. The word-meanings of this type of morpheme, thus, must be carefully distinguished from the sentence-meanings that configuration of these morphemes produce. Sentence-synonymy is not based upon word-synonymy alone. Contrary to the popular view that the meanings of all of the individual words must be known before the sentence-meaning can be known, it is shown that one must comprehend the total configuration of structural-constants and syntactical features in a sentence in order to comprehend the correct sentence-meaning and that this understanding of the sentence as a whole must precede the determination of the correct semantic interpretation of these critical morphemes. In fact, the structural features that produce the sentence-meanings may restrict the possible meanings of even the denotative terms since a structural feature may demand, for example, a verbal rather than a noun phrase as an indispensable feature of the configuration. Two or more synonymous sentences whose denotative terms are everywhere the same but whose structural configurations are not isomorphic express the same fundamental sentence-meaning. The fundamental sentence-meanings can be explicitly formulated, and serve as the mapping functions to co-ordinate morphemically-unlike synonymous sentences within a language system or from one system to another. The research goal of the author is to establish empirically these translation rules that state formally the structural characteristics of the sentence configurations whose sentence-meanings, as wholes, are related as synonymous.

Translating Ordinary Language into Symbolic Logic*

Jared L. Darlington

Research Laboratory of Electronics, Massachusetts Institute of Technology

The paper describes a computer program, written in COMIT, for translating ordinary English into the notation of propositional logic and first-order functional logic. The program is designed to provide an ordinary language input to a COMIT program for the Davis-Putnam proof-procedure algorithm. The entire set of operations which are performed on an input sentence or argument are divided into three stages. In Stage I, an input sentence 'S', such as "The composer who wrote 'Alcina' wrote some operas in English," is rewritten in a quasi-logical notation, "The X/A such that X/A is a composer and X/A wrote Alcina wrote some X/B such that X/B is an opera and X/B is in English." The quasi-logical notation serves as an intermediate language between logic and ordinary English. In Stage II, S is translated into the logical notation of propositional functions and quantifiers, or of propositional logic, whichever is appropriate. In Stage III, S is run through the proof-procedure program and evaluated. (The sample sentence quoted is of course 'invalid', i.e. non-tautological.) The COMIT program for Stage III is complete, that for Stage II is almost complete, and that for Stage I is incomplete. The paper describes the work done to date on the programs for Stages I and II.

The Graphic Structure of Word-Breaking

J. L. Dolby and H. L. Resnikoff

*Lockheed Missiles and Space Company***

In a recent paper[1] the authors have shown that it is possible to determine the possible parts of speech of

* This work was supported in part by the National Science Foundation, and in part by the U.S. Army Signal Corps, the Air Force Office of Scientific Research, and the Office of Naval Research.

** This work was supported by the Lockheed Independent Research Program.

[1] "Prolegomena To a Study of Written English," J. L. Dolby and H. L. Resnikoff.