XIV. MECHANICAL TRANSLATION*

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A. A MODEL AND A HYPOTHESIS FOR LANGUAGE STRUCTURE

A simple model for the production of sentences consists of a mechanism that applies the unordered rules of a phrase-structure grammar. Each rule labels a construction and specifies its constituents. The order of application of the rules is such that the morphemes are produced one at a time in the same time sequence in which they would occur in an utterance. Although there are a finite number of rules in the grammar, they may be reapplied, to yield clauses within clauses. In this way there is no limit to the length of sentence that can be produced.

The mechanism operates with a temporary memory in which constituent symbols are stored until it is their turn to be expanded. Even though the storage device is finite, indefinitely long sentences may be produced. The production of a sentence will never require more than a limited amount of temporary storage if a certain severe restriction is placed on the grammar rules. This restriction is that a rule may be reapplied only if the successive applications are connected in the tree of successive immediate con-stituents through a chain of extreme-right constituents. This simple model is thus a finite-state device.

We advance the hypothesis, to be tested, that all languages tend to conform to this restriction, and that a careful examination of their syntaxes will reveal (a) devices to effectively circumvent the concomitant restriction on their power of expression, and (b) devices to enforce the restriction. An examination of English shows that (a) can explain much of the complexity of its syntax, and that (b) can explain the ungrammatical-ness of many otherwise plausible sequences of morphemes.

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