

Structure of Russian Language Simpler Than Thought, Harvard Computer Shows

Cambridge, Mass. (Science Service)—Experiments in automatic translation at Harvard University have shown that the structure of the Russian language—its grammar and syntax—is much simpler than had previously been thought.

Russian syntactic structures have "a hitherto unsuspected degree of simplicity, regularity and universality," Prof. Arthur G. Oettinger of the Harvard Computation Laboratory, Cambridge, Mass., reported to the National Symposium on Machine Translation at the University of California, Los Angeles.

Sentences Analyzed

Sentences in Russian are now being analyzed for their structure on the Harvard

UNIVAC computer using a simple and elegant, yet powerful, method known as "predictive analysis."

The predictive analysis of language at Harvard, Prof. Oettinger explained, is based on "brilliant fundamental work" by Mrs. Ida Rhodes of the applied mathematics division of the National Bureau of Standards, Washington, D.C.

Predictive analysis can be described as a series of educated guesses, in which each word in the sentence predicts the most likely grammatical form of the following words. Alternative guesses are stored in a special hindsight section of the machine's memory and are investigated only if later words in the sentence show

that the first guess was wrong.

On Computer Tape

Predictive analysis methods are used in conjunction with the Harvard automatic Russian-English dictionary on magnetic computer tape, which now contains entries for about 15,000 words occurring in mathematical and electronic texts.

Russian sentences are fed directly into the computing machine without preliminary editing. The output of the machine is a printed analysis of the grammatical role of each word in the sentence, supplied by the predictive analysis computer program.

The Russian-English dictionary also provides a list of the English equivalents of each Russian word and of all the possible grammatical roles that the particular form of this word may take.

This is not yet automatic translation, Prof. Oettinger emphasized, but it is a long step toward the goal. Right now, predictive analysis is a most powerful tool for learning more about the structure of languages.

The problem of the analysis of syntax is just the same as the "parsing" exercises for diagramming sentences that are familiar to most persons from their school days. Syntactic analysis is not concerned with the meaning of the words in the sentence, but with the questions: Is this a complete sentence? Which word is the subject of the sentence? Which is the verb? What grammatical roles do the rest of the words play?

Different Roles

The problem is further complicated by the fact that many word forms can play different grammatical roles in different sentences. This is true even in a highly inflected language like Russian.

Any method of analyzing a sentence, whether in Russian or English or any other language, results in a diagram that looks like a tree, with clauses, phrases and modifying words branching off the main stem of the sentence, Prof. Oettinger said. When a computing machine analyzes a sentence, this tree structure must be expressed as a string of symbols lying in a straight line.

He noted, however, that a human also receives a sentence as a straight-line string of words.

The predictive analysis technique chooses the correct tree diagram for each sentence by working through the sentence from beginning to end—just as the human reader does.

Treated As Structures

Subsidiary phrases and clauses are treated as structures "nested" within the

Large Food Bills Are No Guarantee Of Good Diet

New York—(Science Service)—Spending a large amount of money on food does not guarantee an adequate diet, a nutrition expert said here.

When a wife works, more money is spent on food, the family dines out more often, and the wife purchases more convenience foods. However, there is no clearcut difference associated with the adequacy of the diet of these households, except where family income is very low, under \$2,000 a year, Dr. Hazel Stiebeling of the U.S. Department of Agriculture told colleagues here at a nutrition symposium sponsored by the Melamine Council.

Discriminating Selections

The fact remains, Dr. Stiebeling continued, that whether or not a family has a diet meeting recommended allowances for good nutrition depends on discriminating selections among the foods on the market and among the foods that are brought into the kitchen and served at the table.

This is especially true for those foods that are important as nutrients but in relatively short supply.

The amount of food brought into the American kitchen tends to exceed what is actually needed, especially when food is plentiful and cheap. The calorie value of such food may amount to as much as 25 per cent to 50 per cent more than the well-fed family needs to eat, the researcher said.

Burning Meteorites Claimed Increasing Growth of Earth

New York, N. Y.—(Scientific American Feature)—Recent studies show that perhaps as much as five million tons of metallic particles fall annually from burning meteorites to increase the bulk of the earth, according to Hans Pettersson, professor of oceanography at the University of Goteborg, Sweden.

"It seems doubtful that life could exist on earth at all," said Dr. Pettersson, "were it not for the protecting mantle of our atmosphere. Every second thousands of solid projectiles, traveling at velocities of tens of thousands of feet per second, enter the earth's atmosphere. These bullets from the cosmos are meteorites, most of them stony but many of iron with an admixture of nickel. The great majority are smaller than a pinhead. But even a particle so tiny could severely injure or kill a man if it reached the earth's surface with undiminished velocity. Death from 'meteoritic stroke' might be a not-uncommon coroner's verdict if the protective canopy of the atmosphere were not spread above our heads.

Energy Transformed

"Friction with the molecules of the atmosphere transforms the kinetic energy of a meteor to heat, lights and mechanical work, and disperses its substance in a fine dust that settles slowly on the earth. A few meteorites, ranging in weight from a fraction of an ounce to tons, are sufficiently massive to penetrate the atmosphere and plunge with impressive force into the ground. Atmospheric friction heats them only superficially. In the case of iron meteorites the surface-heating boils droplets of molten metal into the surrounding air. Instantly cooled and solidified, these droplets from tiny 'cosmic spherules' that settle down to the earth along with the dust of lesser meteors.

"The frequency of meteors, established by visual and radio observation, indicates that they add a respectable tonnage of extraterrestrial matter to the total mass of the

earth in the course of a year. A meteorite as small as a pinhead makes a 'shooting star' and a few such evanescent streaks of light may be seen in the sky each hour on almost any clear moonless night. Shooting stars are especially numerous when the earth crosses the orbits of the several swarms of meteorites that circle the sun. These are most evident in the second week of August, late October, mid-November and the early part of December.

From Mountain Tops

"During the past 13 years I have been engaged in efforts to secure direct measurements of the meteoric fallout. My samples of meteoric dust and cosmic spherules have come from the tops of high mountains remote from industrial civilization, and from the bottom of the ocean. Though the study is by no means complete, the data now show that meteoritic material comes down to earth in much larger quantity than earlier estimates, based on astronomical information, had indicated. Moreover, it appears that the rate of fall has varied during the past 10 or 15 million years. These findings have relevance to a range of questions in geophysics and solar-system astronomy, from the origin of meteorites to the rate of sedimentation in the deep ocean."

Scales of Justice Back in Balance

Helena, Mont.—Mrs. Sara Vincent and some folks from Ogden, Utah, are consistent to say the least. Thanksgiving Day in 1958, while the Utah people were visiting a neighbor of Mrs. Vincent, their automobile was damaged by Mrs. Vincent. Damage \$15.80.

This Thanksgiving, the Utah people, visiting again, accidentally dented Mrs. Vincent's car.

Damage the second time, \$15.80.

RARE RUBIES

Perfect rubies are more rare than perfect diamonds.

Public Road Made Into Drag Strip

San Antonio, Tex.—(UPI)—Bexar County officials decided it was time to crack down on hot rodders when they discovered a pair of youths had converted a public road to a private drag strip.

Constable Henry Satcher said the youths set up a quarter-mile strip, painted start and finish lines and then divided lanes with beer cans for reflectors.

Ralph Ramirez, 19, of Houston, and Charles R. Manno, 18, of San Antonio, were charged with racing after they were arrested by Satcher while performing before a "large crowd of spectators."

Former Detectives Living on Lies

Philadelphia—(UPI)—Two former city detectives are living on lies these days. That is, other people's lies.

John J. Brown and Charles F. Kane, with a total of 19 years on the police force, recently pooled their resources and set themselves up in business as Kane Associates.

The new firm will specialize in polygraph examinations—lie detecting, in short. The company already has a number of accounts from department and other stores as well as numerous types of business establishments.

Kane was the city's polygraph examiner while Brown was executive officer of the Detective Bureau's robbery and auto unit of the major theft squad.

Golfer Winds Up Washing and Drying

Appleton, Wis.—It was the age-old battle of wits over who should wash the dishes.

Darrel Vachon, a farm machinery salesman, was practicing putting a golf ball on his living-room floor when his wife, Gretchen, said he should wash the dishes.

Vachon, who classes himself a pretty fair golfer, challenged Gretchen, who'd never played, to a putting contest to see who would wash.

Losing the first contest, Darrel asked for a rematch. He wound up drying, too.

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