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## The Bilingual Machine

The English and Russian languages are alike in one important respect; the word order is pretty much the same. This fact has for several years fascinated computing-machine experts, who have envisioned giant brains referring rapidly to electronic dictionaries and turning out crude but comprehensible translations of Russian literature.

Last week at the New York headquarters of the International Business Machines Corp., newsmen witnessed how electronic translation works. IBM scientists had fitted one of their huge "701" computers (which rent for \$12,000 a month) with a 250-word English-Russian vocabulary. A typist (who knew no Russian) tapped out on the keyboard the following sentence: "Myezhdunarodnoye ponyimanyiye yavlyayetsya vazhnim faktorom v ryeshenyiyi polyityichyestykh voprosov."

For nine silent seconds the machine mulled over the passage. Then its automatic typewriter pounded out the English translation: "International understanding constitutes an important factor in decision of political questions." Obviously it was a tour de force for a \$500,000 machine to spend its energies translating selected sentences. And it would be equally wasteful to assign any of the other 100-or-so big general-purpose computers to simple linguistic tasks. But computer experts at the National Bureau of Standards, the Massachusetts Institute of Technology, and several other centers, as well as IBM, have started to design machines specially equipped for translating at superhuman rates of speed.

**Ugl or Ugl?** Idiomatic phrases, which are ridiculous when translated literally, are major obstacles to machine translation. So are words which have two or more entirely unrelated meanings. As an example of how such problems can be solved, the IBM crew included the Russian word root *ugl*, which may mean *coal* or may mean *angle*. Dr. Paul Garvin, an Indiana University graduate, worked out rules of context and syntax which determine how *ugl* should be interpreted. These were stored as magnetic impulses on a drum inside the "701." The result was that the machine correctly read *angle* for *ugla* and *coal* for *uglya*.

To scientists who have pondered the problems of machine translation, the "701" seemed to be a disappointingly slow worker. The reason was that the computer had to take time to sort through a stack of punched cards before coding the sentences. Dr. Leon Dostert, the Georgetown University scholar who headed the linguistic end of the project, predicted that within possibly three to five years automatic text-reading machines will be feeding Russian sentences directly into bilingual computers. "At present," he admitted, "we are in the Kitty Hawk stage."