

E. MECHANICAL TRANSLATION

If translation of technical articles from one language to another is ever to be done by machine, it is obvious that one operation such a machine would have to perform is that of consulting a dictionary. Such an operation would be rather easy to mechanize in a special purpose machine, or to program in existing digital computers. It is also clear that other operations will have to be mechanized in order to obtain a good translation. The nature of these other operations is, at present, not completely clear.

An experiment has been performed to shed some light on these other needed operations and to determine what kind of "translation" would be produced by a strict dictionary search and word substitution. In this experiment, a sample word-for-word first approximation or partial translation from German to English was prepared. Grammatical words such as "der", "sein", and "auf" were not translated, the original German word being retained. Furthermore, some of the German endings were retained in an attempt not to obscure the grammatical relations of the original sentence. Thus "beiden" becomes "BOTHen", but "Aussagen" becomes "EXPRESSIONS" because here the ending "en" uniquely means the plural and can be replaced by the English "S".

Several conclusions can be drawn from the result of the experiment. A person who is familiar with German grammar, but not with the specialized vocabulary, can read the material with fair facility. For him, the grammatical relations in the sentences are clear. His reading speed is fairly high because only one equivalent was used for each word of the original text, and the resulting words, whether English, German, or hybrid, are pronounceable. On the other hand, some passages are still obscure. The word "sicher" was translated as "SAFE" when in this context it should have been "CERTAIN", and "Würfels" appeared as "CUBEs" when, from the context, it should have been "DICEs". In a partial translation of this sort, no information is lost, since the reader can recreate the original German text by means of an appended glossary and can puzzle out the correct meaning by standard procedures. However, he first has to be able to recognize that the meaning is obscure. Some words may have the appearance of being the correct English equivalent when in reality they are not. In this respect, systems which supply alternate translations of some words are better, though reading and comprehension speed suffer sharply. A person who does not know German can, in most cases, gather the drift of this partial translation though it costs him quite a bit of effort. He is frequently at a loss to understand exactly what is said, but probably can get enough to determine whether or not the article contains anything that would interest him. It is thought that with a minimum of study he could learn enough grammar to be able to read such "translations".

Look-up time on Whirlwind I turns out to be under 50 msec per word. Machine time would be distributed about equally between input using the photoelectric tape reader,

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look-up from a vocabulary of about 10, 000 words, and delayed output via magnetic tape. Whirlwind I could do such partial translations at the rate of 20, 000 words per hour of machine time (about 50 hours to "partially translate" an entire year of Zeitschrift für Physik).

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