

# MACHINE TRANSLATION

*On November 26—30, 1979, The Second international Seminar on Machine Translation took place in Moscow, USSR. The Seminar was organized by the All-Union Centre for Translation of Scientific Literature and Documentation and the International Centre of Scientific and Technical Information of the CMEA countries. It was attended by 157 representatives from nine countries. 102 reports and communications were distributed to five sections, attention being first of all focused on problems in developing industrial MT systems and computerized dictionaries to aid human translators.*

*We are sincerely grateful to the Organizing Committee of the Seminar for their efficient help in providing materials for the series of papers on MT problems published in this IFID issue. The first report in the series was presented in the name of the Organizing Committee.*

## Machine Translation in the System of Scientific and Technical Translation

*Scientific and technical translation differs substantially from 'general' translation both in pragmatic and linguistic peculiarities. Here it is extremely important to establish correspondences at the level of the expression means of language. Computerized simulation of the translation process, aimed at the creation of operating MT systems, allows a deeper understanding of important regularities inherent in scientific and technical translation. The operating MT systems for scientific and technical translation are based on working linguistic models developed for this purpose.*

The theory and practice of scientific and technical translation are being rapidly developed due not only to the need to overcome language barriers, but also to advances in linguistics which underlie the general theory of translation. Today no one questions the fact that the theory of translation is an independent discipline with its own subject, object and methods of study [1]. But things are much more complicated as regards the stance of scientific and technical translation within the science of translation proper. There is no consensus as to whether scientific and technical translation is a special discipline or just a branch of the general theory of translation. But it is indisputable that scientific and technical translation differs substantially from 'general' translation, if we may call it so, considering that the latter also embraces other extremely diverse types of translation differing not only in their pragmatics but also in their substantial purely linguistic features. The common truth that the translator must know the source language and the target language and also the subject in question is compounded by many circumstances in the case of scientific and technical translation, for example, he not only has to know the subject but he must be an expert in it, too, i. e. he must be able to distinguish the new and unknown from the old and well-known. In a certain sense, we can say that the translator of scientific and technical literature acts as a creator of lexical media for new scientific and technical concepts, as a verbaliser of progress, etc. But the specific features of scientific and technical translation are not connected merely with the problems of the ter-

minology and pragmatics of translation, however complex they may be. There is a whole range of really linguistic aspects of scientific and technical translation which have a substantial bearing on complex language problems. As an initial element of the typology of scientific and technical translation and its varieties we can point to the fairly long established difference between translation proper and interpretation. In this case, translation is treated as the use of language media proper, and interpretation — as the employment of an extra-linguistic situation and logical transformation of statements. The relationship between translation and interpretation is rather complicated. It has been pointed out, in particular, that translation as such prevails in technical translation, while interpretation predominates, for example, in literary translation. But modern conceptions of the character of scientific and technical translation cannot be reduced to such a schematic classification. It is obvious that in technical translation, too, there are (and are bound to be) elements of interpretation. It should be noted that the requirements set on scientific and technical translation are often quite contradictory. Thus, in some extreme cases it is assumed that the translator should make the translated text intelligible to the specialist, even though the author of the text has not expressed his idea clearly in the language of the original. Abstracting ourselves from such extreme judgements, we should state that there must be at least some elements of interpretation. There are also varieties of texts and, correspondingly, their translations, such as juridical or diplomatic documents, where the require-

ments placed on translation do in many ways coincide with those regarding the translations of technical texts. The difference between translation and interpretation accounts for one important aspect of translation modelling. Strictly speaking, interpretation (although ideas regarding the term *interpretation* in the sense indicated above vary greatly) is not translation, and its substitution for language translation signifies a departure from conveying the *way*, the content is expressed, by linguistic means. On the other hand, when conveying *what* is expressed, one departs from conveying the equivalent connotation, from showing *how* a given linguistic content is expressed. For that matter, all sorts of summaries, reviews, brief resumes, etc., cannot apparently be classed as translations. For this reason, the relationship of, or boundaries between, translation proper, at the level of purely linguistic means, and interpretation, following its precise definition, are the subject of a special study on the part of the theory of translation, and, in particular, of scientific and technical translation.

Machine translation is now developing extensively as one of the effective means of overcoming language barriers. In contrast to the conception of machine translation which was current twenty years ago, we do not now set the task of obtaining fully automated high-quality machine translation as a task that can be solved in the near future. This translation may be seen as a sort, of ideal that is sought when operating systems for machine translation are developed. The latter are characterised above all by a lexical approach, that is to say, special attention is paid to working out special machine dictionaries which may contribute to the most effective processing at the lexical level embracing the largest amount of information relevant to translation [2]. In a certain sense, we can say that modern machine translation consists of the improvement of simple systems producing translations close to its word-for-word variant. Typical modern systems are oriented on limited science and technology sub-languages. The job of editing is quite important here, too.

Nonetheless, an automated dictionary is not a system of machine translation, even if it interacts with man. The orientation on limited sub-languages of scientific and technical or other types of communication leaves unsolved problems bearing on the language as a whole, for it is difficult to imagine a situation in which, say, mathematical texts in Russian would exclude a command of the Russian language as such. The entire record of machine translation testifies to the fact that, if the task set is the creation of a machine translation algorithm and not an automatic dictionary, confinement to the narrow specifics of sub-languages may help to reduce the volume of the dictionary or to limit the stock of permissible constructions, but it will not help to solve the main problems involved in analysis and synthesis. For this reason, when dealing with limited sub-languages, one has to solve all the substantial questions of the formalisation and algorithmisation of the linguistic analysis and synthesis as such.

In this connection, as we see it, in solving both the problems of scientific and technical translation as a whole and especially questions of translation simulation for the reproduction of models on electronic computers. Attention should be concentrated on creating linguistic models that most precisely and authentically describe the

process of translation as such in the interaction of language means of expression, first and foremost. These models should serve as a transitional link between the most general models of linguistic activity, e. g., those used in studying the relationships between the meanings and texts, and the totalities of surface facts of natural languages. In our view, these models should primarily reflect translation correspondences for a given pair of languages. In a certain sense, this tendency would carry on the traditions of modern comparative linguistics (contrast linguistics), only the goals would be different in such a study.

It is highly important for applied modelling of this type that the model should reflect the ability of a system to respond to changes. In general, technological characteristics acquire primary importance in applied modelling for the purposes of machine translation. As a theoretical basis for translation simulation in this conception, it is advisable to use the idea of consecutive approximations analogous to the conceptions of approximate calculations in the engineering sciences and computational mathematics.

One such working model can be translation according to translation correspondences (the model of machine translation correspondences), worked out at the All-Union Centre for Translation of Scientific and Technical Literature and Documentation and applied in building the AMPAR system of machine translation from the English language. This model consists of two components, reflecting the statics and dynamics of the translation process, respectively. A special reservation should be made here, that translation at the level of linguistic means should not be treated as patently inadequate and failing to reflect what is not expressed by means of 'surface' syntax, vocabularies, or semantics. A correctly chosen translation correspondence, as demonstrated by the practice of translation activity and, especially, scientific and technical translation, will always find a way of expressing the content adequately in the target language at the level of linguistic means. The typology of translation correspondences which forms the basis of the model, i. e., the division of correspondences into equivalent, variational and transformational ones, provides the basis for broad inter-level modelling of translation regularities. The dynamic component of the model describing the algorithm for establishing correspondences makes it possible to more carefully register semantic signs and the categories, important for translation [3].

The experiments carried out with English-Russian translation using this model have shown that its underlying principles are satisfactory. The further all-round improvement of the model in the course of its experimental use for real translation purposes may help in developing new models of the same class but with greater resolving power. It may be made more efficient by more careful adjustment of the system to the given sub-language.

There is also the possibility of feedback. The experience gained in the translation of scientific and technical texts, using this model and, in general, models of the intermediate class, may help in making adjustments in the typology of translation correspondences in scientific and technical translation and in aligning this typology to the pragmatic requirements relating to scientific and technical translation. The results achieved may also be used in the general theory of translation.

The modern state and further development of machine translation in the USSR do, to a considerable extent, depend on the introduction of operational machine translation systems in the country's information services.

#### REFERENCES

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