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THE TRANSLATOR AS A COMPUTER USER

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In recent years, a large amount of work has been done in the field of computational linguistics which should be of immediate interest to translators, and perhaps also to interpreters. It is the purpose of this paper to bring to the attention of professional linguists the usefulness of, and benefit to be derived from, work currently in progress in this field, and to allay the wariness and scepticism that they may feel towards computers (cf. Arthern 1978, Lawson 1979). We hope to demonstrate that, firstly, given its nature and purpose, auto-matic translation does not work in *competition* with human translators, but rather *alongside* them; and secondly, that there are several other computer aids for translators as yet only available to large bodies employing translators, but which in the very near future should be available to the individual freelance translator working at home on the slimmest of budgets!

Machine Translation (MT)

Most readers will be aware that research into automatic translation is a major activity in the field of serious non-numeric computing. Some may be less aware of its somewhat chequered history, beginning in the United States in the 1950's (Weaver 1949, Locke and Booth 1955), through its loss of academic respectability following the disastrous ALPAC report of 1966, which stated that "there is no immediate or predictable prospect of useful machine translation", to its renaissance in the 1970's, thanks largely to the fact that research is now based on much sounder linguistic theory. Excellent and up-to-date histories of MT are given by Hutchins (1978) and by Vauquois (1979), and Bruderer's (1977) work is, though not very readable, most comprehensive; further historical details would be out of place in this paper.

Some mention should be made however of a few currently operational systems. Research in North America has produced several operational systems, of which perhaps the most well-known are the following. In Canada, TAUM-Météo (TAUM, 1973) produces French translations of weather reports written in English, and the TAUM-Aviation system (TAUM, 1979), again translating from English into French, is nearing full operational implementation. Systran (Toma, 1976 a,b) was originally developed for translating into English articles in Russian scientific journals, and is now used by several large corporations to translate between other language pairs (for example, Rank-Xerox (Elliston, 1978)), as well as by the Commission of the European Communities (Toma 1977, Van Slype & Pigott 1979). In Europe, Grenoble's GETA system (Vauquois, 1975) handles several language pairs, as does Saarbrücken's SUSY (Maas, 1977), albeit experimentally. Lastly, a Chinese-English translation system, CULT, is worthy of mention. This is described by Loh (1976a) and Loh & Kong (1977) and is used extensively to produce translations of the mathematical journal *Acta Mathematica Sinica.* A more readily accessible example of CULT's output is given in another article by Loh (1976b), the English version of which was produced by CULT itself. To complete the picture, mention might also be made of EUROTRA, the MT system proposed for the European Commission (Rolling, 1978). Although this is some way from being operational, researchers from several European countries are already collaborating in earnest on the system, which is being designed to translate between (currently) 30 language pairs (involving the six languages recognized for official use by the Commission).

The quality of the translations produced by MT systems varies enormously. Some are of very poor quality, while others begin to approach a standard which may be described as useful for information purposes. What is the point of MT if the translations thus produced do not compare with human translations? The most obvious advantage of the "inferior" MT product is that it is both cheaper and quicker to produce. These factors alone would not justify the research done on MT however: increase in efficiency is not acceptable if it results in an inferior and therefore undesirable product.

Yet there *is* evidence that automatically produced translations, even if of fairly low quality, *are* acceptable and desirable in certain circumstances. It can often be the case that if a text were not translated by machine, it would not be translated *at all,* so that end-users are pleased to have rough translations quickly and cheaply, from which they can judge whether the original is worth the bother of translating "properly". Van Slype (1979) surveyed 17 end-users of Systran translations, and states that "71% would be interested in receiving unrevised machine translations: —from languages they do not know, — for their persona! documentation and for working documents, — given a rapid service of about half a day, — given low cost." (p.88).

We would not like to give the impression that all output from MT systems is of low quality. Much depends on the input. One idea that has been used with some success is to limit the complexity of the input, and thus ensure good quality automatic translation requiring no post-editing. This limited-syntax and vocabulary approach has been used extensively by, for example, Rank-Xerox (Elliston, 1978), to produce technical manuals in a variety of languages. One result of this technique, as Lawson (1979, p. 81-2) points out, may be that the source texts are written in language which is "more elegant than their standard jargon" and which "reads easily and fast". The French TITUS system (Ducrot, 1972) similarly produces fully automatic translations of texts whose syntax and vocabulary are

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controlled and limited.

In the majority of systems, however, humans and machine co-operate to produce the better translations. The amount of pre- and post-editing by humans differs from system to system. Texts being translated by the CEC's Systran are passed to humans for post-editing only, and it is often the case that the output requires only a little correction. The bulk of texts that must be translated in the Commission represent a drudge for the professional translator — texts for which "style, and even nuances, are of secondary importance" (Lawson, 1979, p.84) - and the ability to off-load this drudge onto a machine that can do the job almost as well, more quickly, and without fatigue, will surely be welcomed by all concerned. This would then leave the human translator free to concentrate or, the sorts of texts that, for the foreseeable future at least, will never be handled by an MT system, and which require distinctly *human* capabilities. Lawson calls these "texts with a message for the less-than-committed reader" (as opposed to "routine information texts") — literary, political, educational texts, whose style is marked by deliberate use of ambiguity, idiomatic turns of phrase, complex figures of speech**,** just those features of natural language that are the most problematic for automatic analysis and translation. These texts require all the ingenuity and creativity of an experienced human if a reasonable translation is to be achieved. Another class of texts that cannot be "trusted" to a machine are those for which an especially high quality of translation is required, for example diplomatic and legal documents. So the off-loading of a huge volume of *routine* paperwork will free the translator for the more interesting, demanding, rewarding and creative work of translating these "sensitive" texts.

Let there be no fear that a sufficient volume of translation work does not exist. Generally, there is a considerable backlog of texts requiring translation. In the CEC for example, where every document must be produced in six languages, often in a hurry, "the style of our translations often suffers because of the very short deadlines against which we have to work" (Arthern, 1978, p.81). This, in spite of the fact that a substantial part of the Institutions' budget is for linguistic services (Sager, 1978, p.5), and approximately 1700 translators are employed full- or part-time (Vauquois, 1979); furthermore, Anderla (1973, p.123) suggested that by 1987 the world's annual production of scientific and technical information would be six times the then current rate. A veritable "translation mountain"!

The translator does have something to offer MT research in return, especially as part of his job may entail revision of machine output. Feedback detailing the kinds of errors that the machine makes (they will be *very* different from human-type errors), together with any linguistic insights they may inspire, will always be of use to the MT system designers, too few of whom, alas, at present at least, have much formal linguistic training. As Arthern (1978) describes, while perhaps few linguists become involved in programming and preparation of dictionaries, others are involved in revising MT output. As a result of this co-operation, "for them machine translation has become a colleague" (p.79).

items. The result of the treatment is eventually a text in which the grammatical structures of the original remain, but with the vocabulary largely translated, as in Fig. 1. Canisius points out that "users with basic [grammatical] knowledge of the original language of a document can effortlessly understand the text on account of the interspersed words" (p.264), and that the partial translation gives the reader some idea of the subject matter of the text. Generally however, the mixed-language output should be seen as one stage in the process of translating a given text, not as an end in itself. The whole system does need the firm support of a dependable dictionary (as well as a lemmatization program to strip affixes), and the next section deals with the use by the translator of the many different types of computerized dictionaries and term banks.

original text:

PROBLEME DES WASSERABFLUSSES VON FAHRBAHNOBERFLAECHEN, WIE WINDRICHTUNG, UNEBENHEITEN UND SPURRILLEN, QUERNEIGUNGEN DER FAHRBAHN UND LAENGE DES ABFLUSSWEGES, WERDEN DISKUTIERT. SIEBEN VERSCHIEDENE TYPEN VON FAHRBAHNOBERFLAECHEN MIT VERSCHIEDENEN VERFAHREN ZUR MESSUNG IHRER GRIFF1GKEIT UND RAUHHEIT WERDEN BESCHRIEBEN.

partial translation:

PROBLEM DES WATER-RUN-OFF VON ROAD SURFACE, WIE WIND DIRECTION UNEVEN UND ROT, CAMBER DER FAHRBAHN UND LENGTH DES RUN-OFF PATH, WERDEN DISCUSS. SIEBEN DIFFERENT TYPE VON ROAD SURFACE MIT DIFFERENT METHOD ZUR MEASUREMENT IHRER SKIDDING RESISTANCE UND ROUGHNESS WERDEN DESCRIBE.

Fig. *1. Partial translation German-English* (from Canisius, 1977, p.267-8)

Machine-aided Translation

As we require the human to take a more and more active part in the mechanized translation process, we move away from MT proper into the area of Machine-aided Translation. Whether the dividing line between MT and Machine-aided Translation is clearcut or not is of little consequence. For us, the difference lies in whether the translation is of whole structures (MT) or of lexical items (Machine-aided), (indeed, the machine may aid only in cutting down the translator's paper work, but more of that later.) In this section, we will consider the use of the computer to provide for the user translations of individual items in the source text, leaving the syntactic transfer into the target language entirely to the human translator. In this way, the machine is used as a type of automatic dictionary.

One such system is described by Canisius (1977). Briefly, the idea is that technical terms are stored in a multilingual dictionary, and that the source text is automatically scanned for an occurrence of any of these

Other computer aids for translators

Most translators will no doubt not be immediately involved with the various MT systems described above. However, it cannot be denied that there is a growing interest in MT — witness the recent commitment of the CEC to a European translation project (Rolling, 1978). This fact, when considered in the light of continuing developments in long-distance information communication systems (cf the various systems being implemented by national Post Offices and television companies) should prompt the professional linguist at least to investigate the field of MT. as it is quite probable that in the future, the individual will be able to access an MT system from his own sitting-room or office via his own TV set. The CEC plans to establish in 1979 a European information network for scientific and technical information (EURONET which will link data bases in several member countries and will be accessed via post office communications. One of the first data banks to be made

the CEC's EURODICAUTOM. A freelance translator will then be able to avail himself of facilities previously reserved for staff translators.

Mention of data banks introduces an area which is perhaps more familiar to the professional linguist: the storing and accessing of terminological information by computer.

There are two main ways of storing and accessing terminological information via computer that every translator should be aware of, bearing in mind the spread of long-distance information systems and the tremendous impact (present and future) of the microprocessor: data may be stored on a vast scale in a *terminological data bank,* whose services are made available to a wide range of users; or, restricted field data may be stored on a medium such as a *floppy disk,* which can be thought of as akin in function to magnetic tape, and which constitutes a permanent record of information that may be accessed by a mini-computer. That is, in the near future, a translator could conceivably possess the equivalent of several bi- and multilingual dictionaries on disk, at a fraction of the cost of a conventional published dictionary. Mini-computer prices are decreasing rapidly, to the extent that the "home computer" is a definite reality. At the time of writing, a suitable computer may be bought for about £300.

Terminological data banks (term banks)
Term banks provide a wide range of different services to many kinds of user: translator, terminologist, specialist librarian, technical writer, language teacher, abstractor, lexicographer, etc. They came about due to a desire not just to store information for its own sake, but to store information on technical terms, industrial standards and the like, and to provide means of accessing these data in a variety of illuminating and rapid ways.

This automatically implies that term banks are not necessarily tailor-made for the translator, and indeed some dissatisfaction over services provided by term banks has been expressed. Several criticisms may be found in Rondeau *et al* (1977) (rather damning) and Arthern (1978) (pros and cons). Nevertheless, the number of term banks is increasing constantly, and the quality of their services is such as to allay criticism. For comprehensive listings of established and proposed term banks and accounts of their organization and services, sec Carestia-Greenfield & Serain (1977), Sager (1978), Sager & Johnson (1978). Term banks catering specifically for the translator include EURODICAUTOM (Goetschalckx, 1977), Bundessprachenamt (Krollmann, 1977), Siemens (Tanke, 1978), Montreal (Dubuc 1979, Pare 1974) and Quebec (Fortin, 1974). Here in Britain, UMIST has recently been awarded a grant from the British Library to conduct a feasibility study into the establishment of a British Term Bank (Sager, 1979a). One important point to note is that if a term bank becomes a reality in the UK then the architects of the bank will be able not only to draw on the best aspects of existing banks, and incorporate the latest in storing and accessing systems, but also to tailor services to provide users with the kind of information they require. Figure 2 shows a scheme for a model term bank as proposed by Krollmann (1971, p.118) which meets the requirements of translators.

Is there however a real need for term banks from a translator's point of view? Let us look first at some consequences of *not* using a term bank, and let us take a simple everyday task: that of discovering the appropriate translation of a new term. The translator's trusty companion, the bilingual dictionary, proves to be of little help in this instance, since, when he bought it, it was probably

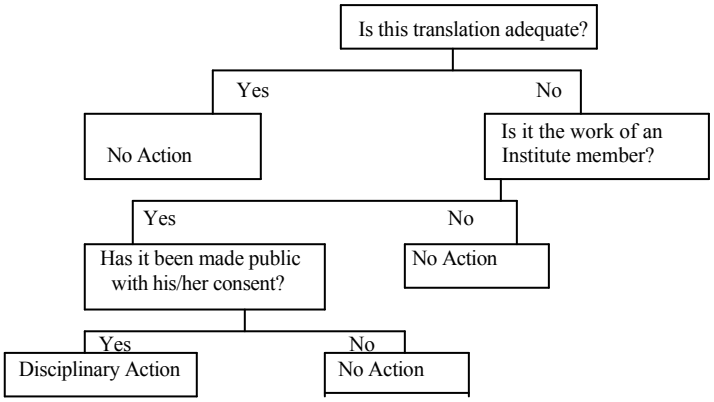

Fig. 2. *Model of a linguistic data bank* (from Krollmann, 1971)

the next edition to find the required term — of scant use when the translation is required immediately! And moreover, by the time the term does appear in print, a revolution in the technology of the appropriate field may well have made the term obsolete. The translator may then have to resort to other methods: consulting other translators' files, or asking an expert in the field. This may provide no help, or produce several different translations. A further method would be to look for the term in the specialized vocabulary of a different field, with the danger of procuring a misleading or totally false rendering. As a last resort the translator may coin a neologism. (Coining of neologisms may have been the reason for several renderings being found in other translators' files). Several translations for a single term together with the proliferation of neologisms raises the problem of *consistency* of translation.

Further, it has been found that a translator spends as much as 60% of his time searching for terminological information in published dictionaries (Lippmann, 1975). What is more worrying, in view of this inordinate amount of valuable time devoted to research, is that according to one study (Krollmann *et al,* 1965), 62.1% of translation errors were found to be caused by terminological inaccuracies. With the information explosion already upon us, and the ever-increasing demand for translations, it is clearly in the interests of all participants in the translation process to ensure that translations can be produced quickly, efficiently and accurately. And at low cost.

We would argue that this may be achieved through use of a term bank. Consider some of the services provided by a term bank and the advantages it represents over the use of conventional printed dictionaries. A properly constituted term bank should provide the translator with, firstly, a rapid means of accessing a far wider and potentially more informative range of terminological data than that combined in a published dictionary (which has the added disadvantages of being bulky, time-consuming to use, soon obsolete, prone to wear and tear, and not particularly cheap); and secondly, various means of presenting data to suit special needs.

The ideal term bank will be equipped with computer dictionaries and accessing systems that are organized in such a fashion that the translator receives just the right type and amount

of information he wants. Criticisms levelled at early term banks were that they provided either too much information which was distracting and misleading, or not enough. The systems of the Bundessprachenamt and of Siemens, for example, provide several useful means of organizing information. At the Bundessprachenamt, the user may request among other services the following: firstly, printout of a text-oriented glossary, which provides translations for specified terms in the order they occur in the text. A study into the use of such an aid found that translators spent a third less time on a translation and made only two-thirds of the errors registered by translators working conventionally (ALPAC, 1966). Secondly, alphabetic printout of a text-oriented glossary is useful for ensuring terminological consistency when work is split amongst several translators. Thirdly, microfiches of any part of the term bank are provided. These are cheap and easy to produce and are ideal for short translation jobs. They may be replaced at regular intervals, which will ensure that the translator has a fairly up-to-date record of the term bank's holdings in his particular field. About 8000 terms can be stored on a microfiche of 10 x 15 cm. For a detailed account of the services offered by the Bundessprachenamt, see Krollmann (1977).

The Siemens system likewise produces text-oriented glossaries and various alphabetical lists, on microfiche or hard copy. Moreover, it provides an ideal example of how a term bank may centralize information, yet make it widely available, for a Co-operative has been formed, which includes Siemens staff, freelance translators, private bureaux, etc. Terminology is stored by Siemens and is made available through various communications systems to other members, who in return play a vital part in contributing data to the bank. For further information regarding this system, see Tanke (1978).

Those translators who work in large organizations will be interested to learn that much research is currently being carried out on on-line interactive methods of interrogating term banks. Such systems implemented on mainframe computers (installations of considerable size) are at the moment only of practical use in large organizations with their own internal communications system, e.g. Siemens. A well-defined interactive interrogation system provides the translator with several options. It allows him to pursue a term's meaning and translation, and the relationships it contracts with other terms, by permitting him progressively to widen or narrow the search space. It provides him with contexts, definitions, sample usages of the term, or a display of the term in a thesaurus-type hierarchy with related terms. It also provides synonyms, antonyms, and near equivalents, indications of style and register associated with the term, and statistics on, for example, the frequency of use of the term.

Arthern (1978, p.93) makes a plea for what he calls a "translator package" which would provide on the screen of a Visual Display Unit the minimum amount of information usually required by translators. This plea arose from his experience of EURODICAUTOM. Carestia-Greenfield & Serain (1977, p.93) likewise suggest that user resistance to computers would be overcome if systems were designed with the end-users' needs in mind.

So far we have concentrated on the types of services provided by a term bank. Little has been said on how a term bank is set up, or indeed maintained. Data for a term bank are culled from a variety of sources: standard specialized dictionaries both mono- and bilingual, glossaries, thesauri, national and international standards institutions, translators' files, contemporary technical reports, circulars, journals, and so on.

One of the prime motivations for setting up term banks is to ensure that the most up-to-date information is made available to users. Two main methods are employed here. New terms are obtained through automatic key-word extraction techniques upon machine perusal of the latest literature. These terms are then processed by terminologists and inserted into the bank. Alternatively, reports arc received of new terms adopted or coined by the translators who use the bank.

This last provides an extremely rich source of information and will not be neglected by the manager of a term bank who wishes to keep or attract customers! A personal interest in any system is a strong motivating factor for using that system. Thus the translator will be able to furnish new terms and translations he has come across, cither by filling in specially formatted cards, or when working interactively, by entering proposed modifications into an intermediate store, which will be inspected regularly by a terminologist. (This constraint is necessary as the main data base will under no circumstances be susceptible to direct modification by the user, for obvious reasons.) Arthern's objection (1978, p.86-7) that a translator working interactively cannot provide as much feedback as one annotating a printout is thus overcome. The terminologist will likewise be responsible for deleting obsolete terms.

Carestia-Greenfield & Serain (1977) and Arthern (1978), among others, both note that there is an unfortunate resistance among translators to computer aids, and especially to interactive interrogation. This is understandable if the objection is that the desired information is not supplied. However, resistance to the computer for subjective reasons must be overcome, for even at this moment difficulty would be experienced if computer aids to translation were not available. Krollmann states that "by and large it is true to say that despite initial opposition on the part of the translators, who at first were sceptical towards the computer, the day to day work of our translation service would now be *inconceivable* without the system" (1977, p.245; our emphasis).

Also it should be clearly understood that as far as the translator is concerned the computer, its dictionaries and accessing system are all part of a "black box". He need know nothing of how they/ operate. Above all, he need not know how the dictionaries are organised. The accessing system, front-ended by a natural language interface, interprets user commands and requests and is responsible for extracting information and presenting it in as helpful and useful a manner as possible. A *systematically* organized computer dictionary contains much information, implied by the way it is organized. One of the main drawbacks to a published dictionary is that the user must be aware of how it is organized, if he is to draw full benefit from it. That is, he must know how entries arc sub-divided, whether compound terms are to be found under the first or subsequent elements, or whether they have a separate entry of their own, etc.

Personal dictionaries and text-processing equipment

The impact of the microprocessor has been such that today a freelance translator may aspire to possessing his own computer. Within a few years, the home computer will be commonplace, For the translator, this means that he will have access to the same kind of services at present provided by term banks, though on a smaller scale. Mention has already been made of the amount of inforrmation capable of being stored on a floppy disk. With his own system, the translator

will of course be able to add or delete terms from his dictionaries at will. Note that access time is usually faster on a small computer with only one terminal than on a main-frame computer run on a time-sharing basis. Moreover there exist already hand-held computers that provide a limited number of translations. While these are still very much at the novelty stage (Blumenthal, 1979), interpreters in particular should follow their development closely.

Another application of computer aids to translators may be seen in the wide range of text editing and formatting equipment and systems now available. These range from word-processors to on-line text-editors to machine type-setters. Working with a text-editor for example, a translator may edit and amend a text at will, change the format, re-arrange the sequence of paragraphs, and produce a final version which may then be printed out on a line-printer or sent down the line to a type-setting device. All this can be accomplished without setting pen to paper. The finished text may also be compressed and stored so that later, should the need arise, all or part of it may be reproduced. Tanke (1978) gives a comprehensive account of text-processing facilities. As for the advantages of text processing, Sager gives some interesting statistics based on studies carried out by the CEC at Brussels and Luxembourg where some 400,000 rough and 130,000 clean pages are produced annually. He points out that 45% of the original effort involved in re-typing revised translations could have been saved by the use of appropriate text-processing equipment (Sager, 1978, p.13-14).

Lawson (1979) makes a plea for "something written specifically for translators" (p.83) and we trust that this article in some sense meets that need. It seems evident to us at least that the translator *of the future* will have to come to terms with technological advances that directly affect his day to day work, and that he will develop, as Sager puts it, "new attitudes and working habits" (Sager, 1979b, p.105).

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