PRACTICAL EXPERIENCE OF MACHINE TRANSLATION
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PSYCHOLOGICAL AND ERGONOMIC FACTORS IN MACHINE TRANSLATION

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The downward trend in the cost of computer facilities will result in increasingly widespread use of sophisticated applications such as machine translation. Many current systems have serious human factors shortcomings, and close attention must be paid to the real requirements of the end user if the full potential of the new technology is to be realised.

INTRODUCTION

In the past computer systems were primarily used by the programmers who designed them, and the facilities provided were those appropriate to their needs. Although these systems functioned efficiently, they were only suitable for use by computer professionals. As costs have decreased, computers have become widely used by people with no previous experience of them. Unfortunately many systems are still designed more for the convenience of the programmer than for the user. This problem will become more acute as further cost reductions lead to even more widespread use of computers in professional applications such as machine translation. This makes it particularly important to take account of the psychological and ergonomic requirements of the ordinary non-specialist user.

Looking ahead on a 5 year time-scale, one can expect an order of magnitude reduction in the cost of computer power. Although it may still require a machine costing the equivalent of today's IBM 370 to use Eurotra, SYSTRAN will be running on the equivalent of today's word processor, and personal micro-computers will be used for word-processing and storing terminology data-banks. Hand-held translators, little more than toys at present, will be capable of storing dictionaries containing tens of thousands of terms. This is only indicative of the potential of the computer of tomorrow. With machines of this capability widely available, the main limitation on the scope of applications in fields such as machine translation will be the imagination of the implementers.

THE HUMAN FACTOR

In the past computer systems could only be successful if designed primarily for machine efficiency. The professional programmer was judged to have done a good job if his program was well coded, and ran efficiently without errors. Unfortunately this philosophy is often incompatible with systems designed for user efficiency. If you ask systems analysts how to make systems user-friendly, they will give you a confident answer, but if you ask 3 analysts, you will probably obtain 3 different answers. The ultimate criterion for user friendly systems should be to incorporate what is easiest and most natural for the end user. This means that tasks that are simple should be simple to perform, with the machine adapted to the user, rather than the user to the machine.

Although this is a principle with which few would disagree, in practice it is easy to find examples of unnecessarily complicated systems. An application in which ease of use is particularly important is word processing. Yet many word processing systems are designed so that changes to a document which appear to be simple, actually involve unduly complicated procedures. A few examples will illustrate the problems which can arise:

1. After editing a document, a simple requirement is to state that editing is complete, and that the changes should be made permanent. On better systems, a simple function button will store the new version of your document, and automatically keep a backup copy of the previous version. However on other systems, the procedure recommended at the end of each editing session involves typing 3 long commands operating on different file names. This process is natural and necessary for the computer, but of no interest to the user.

2. A frequent task when post-editing is to reverse the order of a pair of words. On many word processing systems this was not anticipated, and there is no provision to incorporate this facility as a simple function. On more flexible systems this type of feature can be added as required.

3. On one popular microcomputer, no information is given when there is a machine error, unless the user explicitly asks whether an error occurred. Since errors are not very frequent, few people make a point of checking for errors after every action. However, if errors are not detected when they do occur, whole documents can be lost.

These shortcomings are examples of the low priority frequently given to discovering the real needs of the end user. Looking to the future, the ultimate target for the system designer should be a computer which sells itself. The salesman need only carry the machine into your office, plug it in, and announce that it is self-explanatory, and will solve all your needs. He will then leave you to try it. By the time he returns a week later you should have found it so easy to use that you have already implemented all your office procedures, and have no hesitation in buying it.

ON-LINE SYSTEMS

There is a distinction between direct use of a computer on-line (as for example with the Weidner system), and off line use of machine output (as is normal with SYSTRAN). Using an on-line system is a highly interactive process which in many respects resembles interaction with another person. The user will inevitably project a personality onto the system, which is dependent on the nature of the interaction. A system which, for example, responds helpfully to user errors and incorporates appropriate encouragement, will be perceived as more friendly and will therefore be used more willingly. A cold, concise, and unforgiving machine, although functioning perfectly correctly, will be used with less enthusiasm.

The design goal should be a machine which emulates as closely as possible the behaviour of a helpful human expert.

It is equally important to decide how the user should communicate with the machine. With a VDU the most practical solutions are: multiple choice from a menu, prompting for responses, or simple commands. Menus are a popular solution and give an ideal introduction to a system. Unfortunately, both menus and prompts can become very tedious when a long chain of selections has to be used repetitively. This is particularly exasperating when there is a noticeable system delay after each choice. The best answer is to allow sophisticated users to type ahead a sequence of instructions in the form of a command. Simple tasks should be simple to do, but users with more experience will be prepared to learn more complicated procedures in order to save themselves time.

Eyestrain and fatigue are well known complaints of regular terminal operators. The ergonomics of terminal usage have now been studied in great detail, and almost all the difficulties can be attributed to bad positioning of both the VDU and its operator. Although a well set up VDU should be easy to read, it has a low luminance compared to that of paper in a brightly lit office, and can also suffer from the distracting effects of reflections on the screen. It is therefore essential to place VDUs away from light sources, in a position where there are a minimum of reflections. Another cause of fatigue is bad posture, and the seating and keyboard should be placed so that the user's back is straight and forearms horizontal. Anyone concerned with the positioning of VDUs is recommended to read a book such as the VDT Manual [1].

APPLICATIONS OF ON-LINE SYSTEMS

The technology now exists to implement a totally electronic office. An analogy can be made with the choice already faced by many translators to type or dictate their translation. Although dictation requires a change in working habits, it is usually regarded as the most cost-effective use of a translator's valuable time. Switching to word processing represents a similar change. Although asking a translator to use a keyboard and screen might appear to be a step backwards, a well designed word processor can offer many advantages. Alterations to the text can be made very simply at any stage. Cut and paste within a document is trivial, and it is very easy to store and extract standard phrases and paragraphs held in a personal database.

In the electronic office, documents for translation will be received in machine readable form, or alternatively typed directly into a word processor. A translator can then initiate a request for MT from his terminal, and have the results returned for post-editing. While editing the changes on the word processor, problems with terminology could be resolved by linking the terminal to a terminology data base. When post-editing is complete the translation can be read fluently without the distraction of complicated handwritten corrections. Any further refinements can be made immediately. The word processor can check the spelling of the final document, and automatically format it for printing.

OFF-LINE SYSTEMS

Post-editing is often carried out on batch print-outs from a computer. In this case the content of the print-out is probably predetermined, and the user has little if any control over what he receives. The translator with a print-out may feel like a clerk with a third hand office memo. In these circumstances errors by the computer can be particularly infuriating, and there is a natural tendency to blame the remote entity responsible. This is hardly surprising, since even inanimate objects can appear to acquire a malevolent personality. If you can have one of those mornings when "It's trying to rain, and the car doesn't want to start", it is hardly surprising that you may decide that "the computer is not very intelligent today". Systems you cannot influence are particularly frustrating. In the case of machine translation, the translator will take a less anthropomorphic and more constructive position if he can feed back his own suggestions into the development of the system.

The motivation for introducing MT is normally cost effectiveness of the translation process. This implies that post-editing must be fast, and thus require the minimum of changes. Individual translators' views of what constitutes an acceptable translation will vary, and some will make far fewer changes than others. What constitutes a good post-editor? He needs the flexibility of mind to see how the machine's attempt at translation can, with the minimum of changes, be turned into something acceptable. To achieve this may require training in efficient techniques derived from the experience of the best post-editors.

One fear is that too much post-editing will distort an individual's perception of the language. This risk could be minimised if translators alternated post-editing with conventional translation. If post-editing does have an effect it will probably be some time before this is evident. An analogy may be found with the pocket calculator. Has its widespread use expanded children's horizons, or destroyed their understanding of arithmetic? If the latter, do we conclude that we would prefer to be without the pocket calculator? Can one envisage circumstances where the same would be said of MT?

CONCLUSIONS

The human factors problems of current systems are frequently underestimated. The advent of cheap computer technology offers many exciting possibilities, but its full potential can only be realised if the user's psychological and ergonomic needs are fully understood. It is the responsibility of potential computer users to insist that machines are used to remove the drudgery from life and expand our horizons, rather than become our masters. The machines must serve our needs, and not we theirs. Computers should be allowed to take over the routine work in life, leaving humans free to concentrate their attention on creative activities, and real personal relationships.

REFERENCE

[1] Cakir, A., Hart, D.J., Stewart, T.F.M. The VDT Manual - Ergonomics, Workplace Design, Health and Safety, and Task Organisation. (Inca-Fiej Research Association, Darmstadt, 1979).