

**TOWARDS A MORE-EFFICIENT USE OF  
PC-BASED MACHINE TRANSLATION IN EDUCATION**

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## **1. Introduction**

Despite the failure of some key projects, Machine Translation (MT) has been successfully used on various occasions. For instance, fully automatic MT has been operating successfully on a daily basis for weather forecast translation ([Chandioux 89]). Furthermore, Machine-aided translation (MAT) has been efficiently used for translation of technical manuals and business letters, whilst memory-based MT ([Rinsche 95]) has played an important role in making the work of professional translators more efficient. However, little has been done or written on the use or impact of MT in/on education. In this paper we will try to look at this unjustifiably undervalued application area of MT mainly from two points of view: (i) MT and its use in linguistics and translation studies and (ii) MT and its use in language learning. We shall see that MT has its modest contributions to these areas and will report an ongoing experiment in which an MAT program for PCs is used in learning a foreign language.

## **2. Previous work**

The use of MT in language learning has already been reported in various works ([Comess 86], [Ball 89], [Kudo et al. 90], [Haller 92], [Levin 93], [Narita et al. 94], [Hartley 95]). According to R. Ball ([Ball 89]), "the most immediately obvious language teaching application of MT for students is to correct the deficiencies of translations produced by computer". On the basis of his experience with a French-to-English MT system he suggests that alternative activity (more directly related to the study of the structures of the source language, and less towards the search for suitable target language equivalents) would involve withholding the source text and inviting the student to reconstruct it from the raw translation. He adds that a question like "what is the French original of 'He is older than I am not it'?" could be quite useful for drawing attention to half-forgotten points of grammar and usage. R. Ball also points out that in the case of both correction and reconstruction exercises, the source texts need to be carefully chosen, since the translation sophisticated texts are likely to produce more confusion than an useful exercise. Finally, R. Ball sees three different modes of application of MT in the modern language curriculum:

- (a) using an MT system as a means of learning more about a foreign language (in this case the language, not the MT system, is the object of interest)
- (b) using a particular MT as a way of introducing students to the general concept of machine translation (MT as a field is the object of interest)
- (c) showing students how to use the various facilities available on a specific system and encouraging them to evaluate that system's knowledge (the program itself and its organisation are the object of interest)

and suggests that the first two of these modes seem to be best suited to a degree course.

P. Coraess ([Corness 86]) reports his experience with the use of the ALPS MT system in CALL. He points out that MT offers new opportunities to demonstrate the "contrasts in the structure between the native language and the foreign language, the variety of stylistic expression available in a given language, and the many factors influencing the choice of particular forms and structures in a given case". He expresses the opinion that one of the principal advantages of the use of a MAT program in language learning consists in the power of the computer to make a wide range of on-line look-up facilities rapidly available during the translation process, as required. Almost 10 years later, however, T. Hartley ([Hartley 95]) notes that the use of MAT could be more efficient in translation studies, rather than in language learning.

[Kudo et al. 90] describe the construction of a CALL system on the basis of a MT engine. They claim that the MT engine makes the system much more flexible than a traditional CALL program. The latter "does not have a means to answer the student's question directly except by the crude means of presenting prepared suggestions. On the other hand, using a function of MT, it is possible to translate the sentence immediately or to instruct the syntax knowledge". The authors, however, do not explain what is to be done in the event of wrong MT translation (and how it is to be detected).

L. Levin ([Levin 93]) proposes the development of a Language Learner's Workstation (LWS) based on analogy with a Translator Workstation. He suggests that the LWS should include a number of Natural Language Processing tools including an MT engine, reference material, corpora of texts and videodisks, and tools for teachers and system designers to use in configuring the LWS for specific applications.

The use of MT in translation studies in Japan has been pointed out in [Narita et al. 94]. One of the main ideas is to teach students how to produce more natural and professional translation by doing post-editing. The following rules have been proposed for this purpose:

- Post-edited translation has to be accurate and objective
- Post-edited translation has to include all information from the original text
- Post-edited translation has to be logical and easy to follow
- The same technical or special terms within the same text must be used
- Post-edited translation has to be written for target readers
- Post-edited translation has to sound natural.

The impact of MT beyond language learning has been discussed in [Haller 92]. The author points out several factors which make an acquaintance with Machine Translation systems especially attractive for students of Translation and Interpreting: the requirements of the market, the introduction of new technologies, studying computing as an additional subject, the acquisition of mathematical and logical ways of thinking, the formalisation of MT problems, the influence of the translator on the development of new MT systems, the increased expertise. He also describes the successful use of MT systems in the Department of Translation and Interpreting at the University of Saarland, Saarbrücken.

In our Machine Translation course at the School of Languages and European Studies at the University of Wolverhampton we use the Globalink translation packages Power Translator Professional (Spanish, French and German) and Language Assistant (Language e {Spanish, French, German and Italian}). We also conducted an experiment using Italian Assistant as one of the means of studying Italian from scratch. In the following we will describe our observations on the positive impact of the Machine Translation course and these translation packages on Linguistics, Translation Studies and Language Learning.

### **3. Machine Translation in Linguistics and Translation Studies**

We believe that studying Machine Translation enhances the background of Linguistics and we found that the course<sup>1</sup> on Machine Translation given at the University of Wolverhampton successfully filled gaps in Linguistics and Translation Theory. This course introduced the students to new linguistic concepts and phenomena such as lexical and structural differences in languages, interlingua,

sublanguages, restricted languages etc. In addition, the coursebooks used ([Hutchins and Somers 92], [Arnold et al. 94]) provide a good background of evaluation of Machine Translation which could be useful for future professional translators dealing with evaluation of translation in general.

We also noted that working with an MAT program and carrying out pre- and postediting gives the students valuable insights into sublanguages and controlled languages. In addition, discovering which types of constructions are translated wrongly by the Globalink packages can give good ideas about what is different (lexically and especially syntactically) between the source and the target language. Apart from the standard seminars with this translation software, the students were also offered projects in which they had to pre-edit the source language input and post-edit the target language input, thus discovering by themselves (i) when an MT system can really be effective (ii) what an MT user should do in order to achieve this efficiency and (iii) what the typical similarities and differences are between source and target language.

A research project on Machine Translation can, of course, also have its role in providing more knowledge about the languages involved. While working on a project dealing with anaphor resolution in Machine Translation ([Mitkov et al. 94], [Mitkov et al. 95], [Mitkov and Schmidt 96], [Mitkov et al. 96]), we acquired useful knowledge about the existence of a variety of anaphoric expressions in the languages involved and the about rules according to which these expressions are to be translated.

Last but not least, we think that by teaching Machine Translation to our students we have enhanced their information technology background by introducing them to the use of MT packages, broadening their computer skills and making them more familiar with Internet sites (we exploited various translation resources on the Internet). Perhaps we have created future MT users?

#### **4. Machine Translation in Language Learning: our experiment**

We have recently started an experiment using the MAT package "Italian Assistant" as one of the teaching aids in Italian. The inspiration to carry out this experiment came from our observation that most teachers nowadays are firmly committed to the communicative approach to language learning and some have thus abandoned the older methods such as grammar-translation. However, since a mixture of methods is usually better than concentrating wholly on one particular approach, one could expect that machine translation offers some distinct possibilities.

Our experiments are related to the modules taught this year at the University of Wolverhampton. The Essential Italian module is offered to all students at level 1, with language students studying level 2 concurrently. No prior knowledge of Italian is required to take the module. At the end of 12 weeks students will have mastered the basic structures and vocabulary of Italian.

The Advanced Italian Reading module is offered to those students taking a BALB degree who have only one foreign language to offer. Students must have no prior knowledge of Italian. They will be given grammar lessons to aid them in translating and summarising from Italian into English. This course is not communicative-based and at the end of 24 weeks the students should have developed advanced reading skills and knowledge of Italian sufficient to make adequate translations and summaries from Italian documents.

##### **4.1 Essential Italian:**

###### **a) Introducing the language**

One of the problems for students on this module is that they believe it will be difficult to learn Italian from scratch. It is therefore a good idea in the first lessons to introduce vocabulary similar to English, French, Spanish, etc. so that the students can practise their guessing techniques and increase their confidence of being able to understand the language. Machine translation can obviously be very useful here as the teacher can input short texts or dialogues, on which students can answer comprehension questions. Although this is merely a minor use of machine translation, its psychological importance in the process of language learning is not to be denied.

#### b) Presenting structures

Students could study a text and try to deduce what the grammatical rules are for the use of a structure (e.g. "mi piace" plus singular noun, but "mi piacciono" plus plural noun). Here, sentence translation would be more useful than document translation, as students will pick up the meaning of the structure once the sentence has been translated for them once or twice. They could then untranslate it and do it again. It will also be useful for them to compare the difference between how a structure is expressed in English and then in Italian, e.g. "How many are there in your family?" becomes "Quanti siete in famiglia?". Students can also switch between formal and informal modes of address to compare the difference in grammar between "tu" and "lei".

#### c) Practising structures and vocabulary

The teacher could input texts in which students have to pick out certain structures (e.g. future forms) or word fields (e.g. clothes vocabulary). They could then untranslate the document and test themselves or each other.

Another way of doing this would be to let the student have free access to the machine dictionary or grammar section, not forgetting that the teacher can of course add to the dictionary.

#### d) Revision

As each lesson usually begins with revision of the main points from the previous lesson, machine translation could be used from English into Italian to check the students remember the structures or vocabulary learnt.

### 4.2 Advanced Italian Reading

#### a) Classroom Practice

Machine translation can be very useful for this module, as students spend a great deal of class time on practising translating and summarising. One of its main advantages would be that students could work in small groups and then check their work on finishing. This would then allow individuals to work at their own pace, eliminating the problem for the teacher of knowing what to do with students who finish early or take too long.

#### b) Pitfalls and literal translation

One of the problems facing the translator is how to deal with words which have more than one meaning. Machine translation could help here when used in the interactive translation mode. In this format the machine displays the choice of meanings available and it is up to the student to select the right one in order to avoid making nonsensical sentences. (It would in fact be a good idea to let the computer translate some sentences too literally (e.g. "traffic jam") so that the students can be made aware of the dangers and pitfalls of literal translation).

### 4.3 Self Access

#### a) Extra Practice

A student might decide to do extra practice on any of the above areas because s/he feels the need for extra work, or because of missing a lesson. It would also be a good way of revising for the regular weekly test in Essential Italian Level 1.

### 4.4 The experiment

The aim of the preliminary testing was to verify, if on an initial basis, the Italian Assistant programme could be of some use to students of Italian or those wishing to learn Italian.

The students were given a brief introduction to the program. This generally excited interest and students were keen to see it in action. The group of students was always small (maximum 5 students) and worked on one computer. A file was opened on the computer, which contained a short paragraph of simple sentences about (and prepared by) the teacher in Italian. The sentences were typical of the kind usually introduced and practised in the first lessons of language learning (e.g. "My name is ....", "I am from ....", "I have a brother and a sister" etc.). Students were asked to guess roughly the meaning of the sentences. Some students were quite good at this, whereas others had little idea. Each sentence was then translated by the program into English and the students could then see immediately if their guesses were correct. At the end of the exercise the students were taken back to the original text and asked to remember as much as they could. All students were capable of remembering some parts and some could remember a great deal of it. If the exercise was repeated twice, then students could even remember the text 100%.

A further exercise entailed presenting the students with a list of common nouns (in Italian) preceded by the definite article. The students were then asked to comment on any grammatical rules they could work out regarding the definite article (e.g. "la" in the singular becomes "le" in the plural).

The students were very enthusiastic about this method of language learning, although they were very keen on getting the pronunciation right. Some were obviously more accurate and successful than others, but all of them agreed that they would like to use the program in the self-access centre providing they could have some back-up from the teacher (especially regarding pronunciation).

Preliminary tests suggest that the idea of getting a machine to translate sentences is very amusing and has distinct educational advantages. The programme is obviously not one that students can work on without any supervision, however it would seem to be a useful aid. Nevertheless, further tests would have to establish whether students can sustain their enthusiasm once the novelty has worn off. To sum up we can say that the preliminary tests have been very encouraging and suggest that more research would prove interesting and useful.

We have already mentioned that some authors (e.g. [Hartley 95]) have expressed reservations about the use of MT (or MAT) in Language Learning. We also believe that an MT/MAT program alone would not be appropriate for this purpose. However, our experiments show that MAT could provide interesting and complementary exercises to the traditional methods, especially for people who have little or no knowledge of the language learned. Although it can be said that the written word may have less place in communicative language learning than the spoken word, it is nevertheless true that MT can provide a useful and enjoyable back-up tool for the teacher. Therefore we recommend it as an additional exercise within a wider range of learning tools.

##### **5. Further work: using MAT as an aid in learning Japanese**

We are about to carry out a second experiment using MAT tools for teaching Japanese. We see two major applications: Kanji learning and business letter composition. The latter application seems especially suitable since there are already a few English-to-Japanese and Japanese-to-English translation programs for PCs which (e.g. Atlas) carry out successfully translation of business letters (especially from Japanese to English).

##### **6. Issues which have to be considered before introducing MT as a language learning tool.**

MT should not be used automatically as a learning tool: a few important issues should be considered beforehand.

- The selection of a suitable sublanguage for the MT system

An MT system is more successful in certain sublanguages and much less so in others. If we narrow down the area, (e.g. business), we are more likely to obtain a satisfactory outcome in terms both of translation and efficiency as a language learning tool.

- The presence of a language teacher or assistants

Since MT does not always produce 100% correct sentences, it is necessary to have someone who helps learners with post-editing or checking. Otherwise learners might become confused with the wrong translation.

- Students can work in small groups and check each other's pre-editing and translated sentences

Students are given a chance to compare their work with their colleagues' and learn from each other's work. In the meantime, the teacher or assistants can walk around the computer laboratory to monitor each group's progress

- Producing a manual or hand-out for better MT outcomes

As pre-editing and post-editing play important roles in MT, the language teacher or assistant is advised to produce a hand-out explaining what kind of sentences should be input or how to postedit the translated sentences.

## 7. Conclusion

In this paper we have discussed the use of M(A)T in studying linguistics and translation studies as well as in language learning. On the basis of our experience/experiments we can conclude that M(A)T is useful and complementary in linguistics and translation studies and, when used as alternative back-up in language learning, it can be an enjoyable complement as well.

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