"Lost in Translation": cross-lingual communication, and virtual academic communities

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ABSTRACT:

In most virtual communities, language is at the heart of communication. When we extend these communities to the international stage, we are faced with challenges in interaction. Cross-lingual communication between academic communities is a matter of some urgency. At stake are issues such as project collaboration, timely access to digitally published information; participation in online discussion groups and ability to peer-review. Very important is also the ability of researchers in developing countries to access information in other languages through the Internet. Developing a system that accurately produces a good translation between human languages is the goal of Machine Translation (MT) systems. The growth of the Language Technologies field in recent years, with increasing public, political, and industrial recognition, has meant that there are now major business players engaged in technology integration and product development, leading to a multiplicity of systems and solutions available on the market. This paper starts with a basic description of virtual communities and the communication problems caused by lack of common language. Next, we provide a working definition of translation in general; describe the current state of Machine Translation and the problems of its development. Afterwards, we describe the problems that Machine Translation must solve which are specific to academic virtual communities. We finish by suggesting the potential for improvement in the future.

KEYWORDS: machine translation; academic publishing; academic communication; virtual communities; cross-lingual communication; collaboration

1. Academic Communities of Practice

Many academic and research institutions operate today in a distributed, international environment. Scientific communication has been irreversibly changed since the advent of the Internet. Research, knowledge sharing and academic teaching are becoming increasingly virtual. Hence, for academic communities to function they will have to operate (at least partly) in the virtual world. Some aspects of a CoP (as defined below) should translate relatively easily to the virtual world: common purpose/interest and shared domain knowledge, and shared documents (Hildreth, Kimble and Wright, 2000). Issues of trust, identity and legitimacy arise, however, as well as issues of cross-cultural communication and language barriers.

2.1. Definition of academic CoP:

- A group of professionals, informally bound to one another through exposure to a common class of problems, common pursuit of solutions, and thereby themselves embodying a store of knowledge (Manville and Foote, 1996) .
- Communities of practice are groups of people who share similar goals and interests. In pursuit of these goals and interests, they employ common practices, work with the same tools and express themselves in a common language. Through such common activity, they come to hold similar beliefs and value systems (Lave and Wagner, 1991).

- Groups that learn, communities of practice, have special characteristics. They emerge of their own accord: Three, four, twenty, maybe thirty people find themselves drawn to one another by a force that is both social and professional. They collaborate directly, use one another as sounding boards, teach each other (Stewart, 1996)
- A diverse group of people engaged in real work over a significant period of time during which they build things, solve problems, learn and invent...in short, they evolve a practice that is highly skilled and highly creative (Robert Bauer, quoted in McKenzie, 1999)
- At the simplest level, they are a small group of people who have worked together over a period of time. Not a team, not a task force, probably not even an authorized or identified group. They are peers in the execution of "real work." What holds them together is a common sense of purpose and a real need to know what the other knows (Brown and Gray, 1998)

2. Scholarly communication in a wired world

There is no academic expertise without knowing how to communicate and share that expertise with others. Scholarly communication can take place via a number of documentary genres (as well as conversational genres) including face-to-face meetings, letters, memos, conference papers, technical reports, dissertations, primary articles, review essays, monographs, and edited books. However, the primary scholarly literature is composed of articles (usually published journals or disseminated at conferences) and books. The vast majority of practical projects to use the Internet in enhancing the communication of this primary research literature have focused on articles. In addition, most of the research about scholars' behaviour with electronic media has also emphasized articles, especially those packaged as per-reviewed e-journals (Kling & Callahan, 2002). Secondary services, such as computerized indexing and abstracting databases also help scientists identify documents which may be relevant to their research.

The Internet is a continually evolving network of computers and telecommunication, which provides the context for today's cross-cultural and cross-lingual communication. E-commerce, electronic mail, SMS, newsgroups, forum groups, bulletin boards and web logs, as well as synchronous communication software better known as "chat" allows for communication with people all over the world. By participating in these interactions and creating a web-page or website, an individual or an institution establishes visibility to an international community. This scientific information is conveyed in a bewildering array of languages, reflecting the international nature of scientific activity. Although the languages used might be diverse, the actual content of much scientific writing is international in scope and relevant to scientists regardless of geographical location or native tongue.

Information generated by scientific research is communicated to others for a variety of reasons:

- Establishing a claim to the work accomplished
- Adding to the store of scientific knowledge from which others may draw
- Preventing duplication of effort in research
- Collaborating in further research
- Knowledge sharing to promote progress in less developed areas

3. Language Barriers

Despite the visibility provided by the Internet, and the importance of the Internet as a facilitator of quick knowledge, exchange barriers to communication disrupt the information cycle. One of the main barriers continues to be a principal obstacle – language. If someone intends to reach speakers of other languages, the contents of their website/posting/electronic publication needs to be translated.

A very large and rapidly increasing quantity of literature in all fields of knowledge is in language other than English. A significant proportion of this literature is relevant to research and scholarly activity of English-speaking academics and researchers, but because of the language barrier, important elements of it are likely to be overlooked or underutilized. To the extent that progress is linked to effective research and development, the adverse consequences of such situation are obvious. The academic sector is of course only one of many to which this position applies (health services, e-commerce, and industry being a few others). It is, however, an important one, since the universities account for a large proportion of a nation's research manpower and expenditure, as well as carrying the principal responsibility for training the researchers of the future. Furthermore, universities' research activities are not limited to any one group of subjects but encompass the whole field of knowledge. Therefore, it seems reasonable to assume that what is a problem in the academic field will often be one elsewhere.

Language barriers face all scientists, but they are much more formidable for some than for others. In general, the smaller the amount of literature published in a language, the greater will be the language difficulties facing scientists whose native language it is, and vice versa. Only a fraction of the several thousands of written languages in the world are significant for scientific communication, with around 60 languages well encountered in the course of a literature search in many scientific subjects. This is a sufficient number of languages to cause problems for almost all academics in the scientific community.

Any library of an established university contains extensive holdings of foreign materials (in hard copy and electronic formats), which represent a considerable investment of past and current resources. Few decades ago, it used to be a case where academics were assumed to have at least a working knowledge of a few foreign languages (German and Russian were in fashion in sciences, and French in arts) and be prepared to read materials in their specialisation in foreign languages if need be. However, the language competence of English-speaking academics is deteriorating, with English now being the "international language" the way Latin was in the Middle Ages. As such, there is now a perceived need for translation services.

An example of problems created by a language barrier can be seen in this excerpt from Canada:

> *"It must be recognized that the language barrier creates a structural impediment in the way of advancing the Canadian studies enterprise. Francophone academics in Quebec have been preoccupied with deepening their understanding and appreciation of Quebec society; (…) A parallel reality exists in English-speaking Canada. The vast majority of English-speaking scholars are able to pursue satisfying careers almost exclusively in their mother tongue. Their key networks and institutions are English-speaking, and the formal boundaries between Canada and the United States, Australia or Great Britain very often have little relevance in defining their spheres of intellectual endeavour. The result, so far as francophone and anglophone Canada is concerned, is limited "inter-community" communication and the isolation of the two scholarly communities. Virtually none of this is a function of conscious choice, still less is it a matter of ill will, on either side of the language divide. It is rather the product of the natural flows and frontiers that are created by the simple existence of language communities. (…) It also means that too often English-speaking academics, in pursuing their teaching and scholarly enterprises, unconsciously exclude Quebec from consideration when they are examining matters of significance in Canadian life"* (Cameron, 1996).

Another example was a pilot project for international electronic distance education in the field of computer science, instituted in 1997 between California State University and Tomsk Polytechnic University in Russia. The fundamental technologies used for this program were email, telnet and web pages. The only major drawback was the language barrier in that the class was taught in English, limiting prospective participants. (Kesselman, 1997).

4. Position of English as an International Language

Index Translationum (UNESCO, 2002) provides the following statistics for original language of publication of materials translated between the years 1976 and 1996: 49.39% were published in English, 11.14% in French, 9.06% in German, 8.86% in Russian, 2.91% in Italian, 2.0% in Spanish, and 1.80% in Swedish. The world speaks over six thousand languages. Simple calculations show that 7 languages produced 84.26% of world's written words, while the remaining 5993 languages between them managed to produce the remaining 15.74%.*

If we now look at the reverse side of the coin, meaning who does most of the translations, things look quite interesting. Top translating country is Germany, followed by Spain, France and Japan. USA comes ninth, Canada 22nd, and UK 25th. There is an inverse correlation here: the more a country publishes, the less it translates. Over the last two decades, USA translated mostly from German and French, and a little less from Russian. A similar situation applies to the UK and to Australia. Canada, with its own bilingual problems, seems to be translating mostly from English. And here again, an interesting situation: whereas the Francophile part of Canada managed to translate 13925 books into English, the Anglophile side translated only 2529 French books in as many years. In general, English is the fourth target language, preceded by German, Spanish and French.

Estimates produced for various research fields show that a majority of research papers are nowadays published in English. Even in a language-sensitive subject such as linguistics, nearly 90 per cent of the 1,500 papers listed in the journal *Linguistic Abstracts* in 1995 were in English, not to mention such an Anglicised field as computer science, where the proportion is even higher (Crystal, 1997). Furthermore, according to Crystal, English is becoming the normal medium of instruction in higher education for many countries, even those where the language has no official status. For example, advanced courses in The Netherlands are widely taught in English. Not surprisingly, many international scholars prefer to present their research findings in the English language, believing that this will essentially promote their professional development and scholarly career. As early as 1975, a French doctor bemoaned French as "a dying language," and stated that "*most of the best French contribution in science and medicine are published in English (…) all French research of quality is presented in English at international scientific meetings, and (…) French scientists and doctors are informed of the advances in their fields by books and reviews published in English*" (Meyers, 1975). A German scholar even predicted that it is only a matter of time before German universities become completely Anglicised (Erling, 2002). In 2001, Brocke-Utne addressed the danger of English in higher education in Norway, discussing phenomena threatening the Norwegian language: the increasing use of English words and the recruitment of teachers who do not speak Norwegian.

5. Role of translation in scientific communication:

English is, in fact, the most commonly used language in scientific and technological publications. It probably accounts for between one half to two-thirds of the total, at least in its initial publication. It does not justify the assumption that because a researcher can read English, he or she can safely ignore the remainder. The fact that a text is in a foreign language (i.e. other than English) does not reduce the probability that it will be useful.

In an academic world whose inhabitants are increasingly involved with one another across the frontiers of culture and language, good translations are an absolute necessity. A research done in France shows that among 191 respondents questioned regarding their use of Medline, 22% thought English was an obstacle to their bibliographic retrieval. However, the research software was generally underused and the quality of the retrieval weak even for the remaining 78% of users (Mouillet, 1999).

Yet good human translators are also a scare commodity, especially in the fields of technical and scientific translation. The localization business is intimately connected with the software industry and companies in the field complain about the lack of qualified personnel that combine both an adequate linguistic background and computational skills. The emerging technologies, and the need for multilingual support for both text and voice to reach audiences beyond one's own language and cultural boundaries, all work to redefine the translators both in terms of their roles in providing language support, and in the kinds of knowledge and skills that digital literacy requires.

6. To MT or not to MT?

6.1. Definitions:

Before we plunge into discussing the merits of machine translation, a few definitions are in order:

- the emerging field of multilingual support in digital environments is called tele-translation and tele-interpretation.
- the process of recreating a website in specified language is known as Web localisation and is currently one of the fastest growing areas in the translation sector. To localize a web page it is necessary to be able to work with different scripting languages (HTML, XML, VB, Java, etc.) and multimedia components such as JPEGs, Flash presentations, RealAudio files, etc.
- translation memory (TM) is a software application which compares a new source text against its previous version and allows recycling of previous translations for the applicable portion. In this way, electronic documents have a great compatibility with language engineering.
- Machine translation (MT) is the use of computer software to translate text or speech from one natural language into another. Like translation done by humans, MT does not simply involve substituting words in one language for another, but the application of complex linguistic knowledge: morphology (how words are built from smaller units of meaning), syntax (grammar), semantics (meaning), and understanding of concepts such as ambiguity.

6.2. The need:

This multiplicity of types of electronic documents creates a new kind of literacy called digital literacy. Certain contents such as multimedia or voice mail are created electronically from beginning to end, often in forms that would not be possible otherwise. Very large manuals for the operation of equipment, most of which are subject to regular updating, are now published in digital format, either on CD-ROM or through online distribution.

Scholars perusing electronic material stumble into language barriers and seek language assistance, since not all electronically published materials are available in their language. There are attempts at engineering solutions to meet such demands: new applications have been developed to allow real-time browsing of Web pages with automatic translation of Web sites, e-mail and chat messages or search engine results.

Research on machine translation began in the 1950s and has largely remained to this day an activity which combines an intellectual challenge, a worthy motive and an eminently practical objective. The challenge is to produce translations as good as those made by human translators. The motive is the removal of language barriers that hinder scientific communication and international understanding. The practical objective is the development of economically viable systems to satisfy a growing demand for translations that cannot be met by traditional means. The research and development is underestimated and not given its due because of unfulfilled expectations and sceptical prejudices. It has already taken twenty years since the ALPAC report to demonstrate that there is practical value in systems capable of producing translations that are less

than perfect. It is only recently that the results and progress of machine translation research are beginning to be recognised by translators, administrators and the general business community.

Beside the so-called "complete translation", there is also a perceived need for multi-lingual information retrieval and search systems. There have been recently attempts at creating such services [see, for eg. Lin, (1999) for an experiment done in Indonesia Bahasa; Aljilayl et al. (2002) for similar approach to Arabic; and Gey & Oard, (2001) for Arabic-English-French combinations.]

6.3. The benefits of MT

MT has the following benefits (Theologitis, 1998):

- *Improved quality* due to greater terminological and phraseological consistency. The ease with which terminology can be looked up as well as the speed of the search make inserting the correct or the accepted term in the document a simple, less time-consuming task.
- *Enhanced productivity*. With translation memory software there is no need to re-translate what has already been translated. MT software has a better memory than human translators: it can store translated documents and re-use phrases that have already been translated. The system can operate non-stop 24 hours a day. In order to achieve higher volumes, the system can be simply "scaled-up" by adding more server machines to the translation cluster.
- *Portability.* The possibility of transmitting by electronic means all supporting documentation as well as the linguistic resources that go with the text such as reference documents, translation memories, terminology and other types of electronic prepared resources.
- *Faster.* MT is much faster than human translation (humans can translate 2000 - 3000 words a day, while Systran's (www.systran.com) MT software can translate 3700 words a minute).
- *Cost reduction*. MT is much cheaper than human translation, provided you do not need a high-quality translation or you have large quantities of source text in an appropriate machine-readable format that you can control so that it conforms to a sublanguage that can be handled by computers. If neither condition holds for you, then the total cost of machine translation, including text preparation, terminology preparation, and post-editing, will probably be prohibitive, with the result that machine translation is not for you, at least until non-objectivist intelligent computers appear on the scene.
- *Consistency*. Because machine translation is a software system - it is programmed to operate in a particular manner and will continue to do so indefinitely. A comprehensive suite of quality-control tests allow us to guarantee that our solution will translate the same phrase consistently over time. Human translators, on the other hand, are much more likely to be inconsistent with their chosen wording and phrasing due to human nature.
- *Lack of Bias.* The machine translator is based on a complex set of databases and processing rules. Quality translation solutions will translate all incoming text using the available rules and cannot be biased with choice of wording or by omitting, inserting or subtly changing the meaning of text.
- *Availability.* The demand for translation globally (particularly with new members joining the European Union in the near future) is increasing drastically. It is becoming increasingly difficult to even find suitable translators for important international governmental and business meetings.

6.4. The Problems with MT

Machine translation (MT) will rarely satisfy all of the users' varying communication needs:

- No current operational machine translation systems can produce good quality output without either placing restrictions on input texts or involving human assistance before, during or after translation processes. Those involved in MT development and utilization admit the necessity of pre-editing documents for translation in order to guarantee reasonable results. Users are beginning to realize that they must control the kind of language that they use when they intend to communicate across languages by eliminating, right at the start of the publication's development cycle any factors that are likely to hinder localisation. This process may sometimes involve extensive culturalisation of content, including certain non-verbal elements such as icons and layouts, to make the presentation more suitable for the target audience. Melby's (1995) fascinating paper on culturally inapt machine translation is worth mentioning in this context.

- Present machine translation systems make 'simple' grammatical errors that no human translator would make. All have difficulties in the selection of pronouns, prepositions, definite and indefinite articles-particularly when translating from languages such as Russian which do not have articles. The revision of machine translation output typically involves a great deal of low-level correcting, and it is not surprising that translators have a generally poor opinion of machine translation systems. Revisers of machine translation output are prepared to accept difficulties with technical vocabulary and with homographs and polysemes, but the repetitive correction of the same mistranslation is irritating, both for post-editors and for operators of interactive machine translation systems. Much can be done to simplify the editing facilities, but it would be preferable if the mistakes were not there in the first place.

- Machine translation cannot as yet deal with culturally-based ontological issues (Akahani et al., 2002), although this has been attempted (Hovy, 1998)

- Most of the current efforts in machine translation have not progressed much past the stage of providing low-quality translations based on ever-expanding vocabulary databases. This highlights the fact that computers simply lack common sense or a feel for ambiguity, syntactic irregularity, multiple word meanings and the influence of context, subtlety, irony and humor in addition to the ability to handle complex syntax, semantics and idiomatic expressions across languages. Despite recent efforts to include the parsing of sentences before translating and the use of complex algorithms, one author commented on his experiments with commonly available translation software by noting that "*most translations fell somewhere between impressive and nonsensical; in general they were surprisingly understandable, if odd and stilted*" (Budiansky, 1998).

- Machine translation works quite well for translating predictable technical texts – texts that never go beyond the expected domain of discourse. This is of little help in the domains where people want translation the most: for spontaneous conversations, in person, on the telephone, and on the Internet.

- Computers cannot translate like humans because they lack of agency: "the capacity to make real choices by exercising our will, ethical choices for which we are responsible… A computer has no real choice in what it will do next. Its next action is an unavoidable consequence of the machine language it is executing and the values of data presented to it…Without agency, information is meaningless. So a computer that is to handle language like a human must first be given agency." (Melby, 1995).

7. A Sample Review of Available Translation Software:

Due to lack of space, only a few of the machine translation software packages are discussed in the following chapter. The software is reviewed in alphabetical order, and according to my linguistic ability to trial it. The list is limited to software translating to or from English. Hundreds more of other language couple packages exist.

- ATA Software - http://www.atasoft.com (English/Arabic): On the market since 1997, ATA provides an online instant text and website translation service as well as a bi-directional dictionary (www.almisbar.com). It also released Al-Wafi, a stand-alone translation package that operates on Arabic Windows (or Arabic-langauge support enabled Windows). The standalone software allows for creation of user's dictionary. Accuracy: approximately 60%.

- G. D'Agostini, D'Agostini Organizzazione S.L. - http://www.dagostini.it/Hypertransinfo/Hypertransinfo (German/French/Spanish/Italian/Portugese/Russian/English). Hypertrans was created in Italy in 1987, specifically to translate patents. To see an example of the software's Italian to English translation, go to http://www.european-patent-office.org/epidos/conf/eac98/proceedings/dagostini.pdf. Although the translation is clear and readable, there is much left to desire in terms of syntax and grammar.

- IBM – www.ibm.com (English to French, Italian, German and Spanish and from each of these languages back to English).The Via Voice Translator is said to provide convenient text and Text to Speech (TTS) translation of words and phrases on select iPAQ pocket PCs. Translator is designed for both the business and casual traveler, with a simple interface that enhances ease of use. Despite the good marketing, the best it can produce is pidgin English (I am very forgiving at that).

- Language Engineering Corporation – www.lec.com (multilingual) Logomedia is advertised as a "professional translation solution". It provides powerful interactive tools to correct and refine your documents, including alternate translations, part-of-speech settings, alternate words, and allows for developing of one's own translation memory archives and user dictionaries to ensure consistent use of terms and improved translation quality. Technical dictionaries are also available to provide additional terms for specialized fields. It also provides a set of cooperating tools for a wide variety of translation tasks including batch translation, Internet translation, interactive translation, immediate translation, translation-as-you-type, and more. There is an online demo. For the purpose of this paper, a translation of Polish website was made into English language. The translation was almost unreadable, with many of the Polish words transliterated into English. Translation from English to Polish was a bit better, but suffered from the same transliteration problem, and the software failed to reproduce English grammar and syntax into a readable form.

- Language Experts LTD – www.transexp.com (multilingual) produces the software NeuroTran, which supports English, German, French, Spanish, Hungarian, Polish, Croatian, Bosnian and Serbian. There is no interactive demo, but the company provides a white paper with screen shots of how the software functions (http://www.tranexp.com/win/NeuroTra.htm). The software is aimed at translation of web pages, e-mail, faxes, memos, manuals, reports, spreadsheets, correspondence, letters and more to and from a foreign language. If one has to go by what the White Paper presents, the translations do provide a gist of the material.

- SYSTRAN - http://www.systransoft.com/ (multilingual). This is the state-of-art translation software used by the EUC. SYSTRAN is one of the first and is one of the few remaining independent Machine Translation (MT) developers, having been on the market for 30 plus years. SYSTRAN's technology is developed under Linux and runs on all Unix platforms and Microsoft Windows. All SYSTRAN systems utilize one engine and use the latest Natural Language Processing (NLP) technologies. The systems integrate finite state technology to accelerate access to very large linguistic knowledge bases. XML, Unicode and HTTP standards are central in the design to address multilingual issues in applications such as Web, email, Intranet, publishing, etc. SYSTRAN provides an online translation service on its homepage. As an example, we took the following German sentence "Blick mit der Webcam auf die Baustelle der VOLKSWAGEN Uni-Bibliothek UdK und TU Berlin,"

which in English means „A webcam view onto the construction site of the Volkswagen TU Berlin library." SYSTRAN's online translation gave us the following – very enlightening – translation into English: "view with the Webcam on the building site of the VOLKSWAGENS university University of UdK and DO Berlin." This is, by far, one of the best translations obtained.

These are merely examples of available software. A separate paper would be needed to provide a comprehensive review of all machine translation packages currently in use. The choice was arbitrary, and the aim was to show the imperfections of linguistic rendition.

8. What about the future?

Translation software has an obvious relevance to academic communication. However, due to the sensitive nature of much of this communication, accuracy in translation is of high importance and it is not likely to be trusted to computers in the near future. However, machine translation systems designed to deal with limited domains of discourse and limited vocabulary may become useful for academic and research organisations in the near future.

Those who are fully aware of the complexities and subtleties of language are convinced that any kind of machine translation is inherently impossible (Schwarzl, 2000). Nevertheless, there is a great deal more to be achieved before it can be said that machine translation research has delivered what it set out to do. MT is a long way from being able to replace human translation, and many experts feel it may never do so. But it can reduce the amount of work for human translators by taking over translations where accuracy is not essential, and by assisting humans with more important translation jobs.

The accuracy of MT is much lower than competent human translation, but can be improved in certain ways – for example, by ensuring that spelling and punctuation are all correct in the original text. When used in conjunction with human translators – to provide a first draft which is then given to a human for polishing, MT can save time and money.

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