Controlled Language, Web Usability and Machine Translation Services on the Internet

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This paper examines the extent to which the writing style of texts published on highly usable websites provides input that is amenable to Internet-based machine translation (MT) services, thus giving rise to a form of MT-friendly controlled language, in a loosely defined controlled translation environment for web content. Controlled languages are traditionally divided into two groups, human-oriented and machine-oriented, depending on the purpose and applications for which they have been developed. Even though this distinction is justified and useful in a number of respects, it is recognised that these two types of controlled languages often share significant features.

The paper investigates the common ground between human-oriented and machine-oriented controlled languages in the context of reader-friendly monolingual on-line material that needs to be translated into a variety of target languages by means of web-based MT services. The paper argues that a usability-oriented writing style for originally monolingual web content not only improves the readability of on-line material for human Internet users, but can also dramatically improve the performance of web-based MT systems. The discussion suggests in conclusion that authoring conventions and guidelines primarily aimed at improving readability for human users in the Internet environment also have a significant impact on the successful application of on-line MT technology, if monolingual web content needs to be disseminated in a variety of languages.

1. INTRODUCTION AND BACKGROUND

A number of on-line machine translation (MT) services are currently available for a wide range of language pairs on the Internet[1], and over the last few years popular search engines, browsable directories and portals have offered links to such services (cf. Yang & Lange 2003). Also, an

increasing number of monolingual websites incorporate links to on-line MT services, encouraging visitors to use them in order to obtain machine translations of their own web pages into more familiar languages.

As a result, more and more Internet users take advantage of Internet-based MT systems offering translations in real time for a large number of language combinations when they come across websites whose content is only available in languages unknown to them. Some reports suggest that on-line MT services can in fact prove helpful in providing quick access to the main content of websites and on-line material in general, since Internet users are prepared to accept and read raw MT output (see e.g. Flanagan 1996; Flanagan 1997; Hutchins 1999/2003; Yang & Lange 2003).

Raw MT output that is readable in a more familiar language is intended to offer the web-surfer a rough indication of what the original Internet site is about for gisting purposes. Rapidly skimming an on-line document can in fact be particularly useful to identify and assess the importance of web pages or Internet sites for a given purpose, e.g. when searching on the World Wide Web multilingual material that is relevant to a specific topic. Typically, all the users need to do to take advantage of on-line MT services is to provide in a specific field the URL of the source web document, select the desired language combination for the job and submit the translation request.

The input is then a whole web document comprising for instance hyperlinks, frames, banners, etc. On-line MT services transfer the textual content of the original into the target language desired by the user, leaving graphic layout, presentation style, frames and visual objects unchanged. That is to say that from a graphic and technical point of view elements such as pictures, icons, banners, background colour, etc. are preserved thanks to embedded filters that protect the HTML tags and the overall format of the source web page in the machine-translated document, and the text is translated into the target language chosen by the user.

2. THE LANGUAGE OF THE INTERNET: UNRESTRICTED INPUT FOR ON-LINE MT

On the linguistic level, but regardless of the specific language pair involved in the translation process at hand, web-based general-purpose MT services are usually available for on-line use without restrictions of any kind, even though sometimes there are limitations to the length of the input text. As a result, these systems are in general exposed to the translation of unpredictable source texts published in a variety of websites, encompassing an incredibly wide spectrum of potential input.

In such a fragmented scenario there are considerable differences across textual domains with respect for instance to jargon, specialised terminology, occurrence of proper names of places or people, presence of culture-bound references, use of acronyms and abbreviations, register variation (formal as opposed to informal or low), etc. Documents fed into on-line MT services may in fact belong to all sorts of genres and text types, e.g. love letters, personal biographies, technical reports or manuals in several fields, informal memos, obituaries, recipes, weather reports, etc.

Texts written on a web page may also be ungrammatical, as could for instance well be the case if authors of virtual documents are not native speakers of the language in which they write, and could even possibly have a faltering command of basic morphology and syntax. Furthermore, texts published on websites that Internet surfers could translate by means of on-line MT systems may be filled with slang, taboo words, or contain highly unconventional language that deviates radically from standard and stable use in various respects and at different levels, e.g. vocabulary (presence of acronyms, technical terms viz. proper names, etc.), distribution of punctuation marks, misplacement of capitalisation, grammar, syntax, etc. (cf. Yang & Lange (2003:195-196)).

As a result, web-based MT systems may find such highly idiosyncratic texts intractable in the analysis phase. Interestingly, Yang & Lange (2003:205) point out in particular the extent to which the free on-line MT service Babelfish is exposed to the translation of X-rated material found on the Internet. As a matter of fact, it is reported that some users feed sex-oriented input into this free web-based MT system, and they apparently expect it to be able to handle adult material. In this area the performance of the on-line MT service hinges crucially on the presence of strong language and risque terms in the vocabulary, thus calling for action at the lexical level, so as to include the translation of taboo words and expressions.

On a more general level, and regardless of which domain is taken into consideration, even though all the vocabulary is in the lexicon of the MT system, there may be problems in processing the input if the source document to be machine translated has long and complex sentences. On the other hand, however, very short and concise formulations containing words unknown to the MT software (an obvious spelling mistake can for instance make it impossible to recognise a word during the analysis) would equally be most likely to give unreadable output, possibly with words left untranslated in the target document.

Along the same lines, simply focusing on written textual information that is usually found on any web page, one may easily think how diverse

the patterns of language use that feature within individual potential input documents are. This is the case when for instance a web page displays at the same time a concise title at the top (maybe with verb ellipsis and the use of some metaphor), a succinct caption under an image, single hot-words that constitute links to other related pages, juxtaposed key-words that describe the contents of the various sections of the website, along with longer informative paragraphs as well as descriptive or narrative passages.

Such typical linguistic variety found within individual web pages is combined with the differences across several text types, due to the peculiar characteristics that each of them possesses. Crystal (2001) provides a convincing overview of the amazing linguistic diversity that is found today on the Internet. This situation would seem highly unfavourable to the employment of on-line general-purpose MT services to translate unrestricted and unpredictable input, since they are usually best suited to well-behaved language following standard predictable rules and straightforward style conventions. The simultaneous presence of very different patterns of language use within typical written on-line documentation, on the other hand, is a serious potential stumbling block for the successful application of web-based MT services.

An informal examination of originally monolingual Internet sites offering links to on-line MT services for multilingual dissemination purposes shows that in general their linguistic style does not take into account the subsequent application of MT on their content. Feeding unrestricted and uncontrolled input to on-line MT services presents numerous challenges compared to well-established methods providing safe environments for the successful application of MT technology, that have proven the viability of machine translation software under certain well-defined circumstances.

Familiar examples of strategies that have been implemented especially in institutional and corporate settings to increase the likelihood of successfully exploiting MT software are the so-called sublanguage approach in highly specialised domains (see Kittredge & Lehrberger 1982; Grisham & Kittredge 1986; Kittredge 1987; Somers 2003b) as well as pre- and post-editing techniques (see Wagner 1985; Vasconcellos 1986; McElhaney & Vasconcellos 1988; Senez 199Sa; Senez 1998b; Allen 2003); finally, other strategies and techniques include tailor-made and customised MT engines or the use of pre-defined prescriptive controlled languages to provide MT-friendly restricted input, which will be discussed in more detail in the next section.

Even though international companies and multilingual institutions have received significant benefits from these approaches to the use of MT technology, such scenarios are simply not available in the Internet environment: on-line MT services work in batch mode, i.e. they typically process the input source document "as it is" and offer its automatically translated version in real time, without any form of external human intervention (as either pre- or post-editing), neither can an on-line MT system be usually fine-tuned or customised in any way, e.g. augmenting the lexicon to guarantee adequate coverage of vocabulary. The rest of this paper focuses on the relationship and possible overlap between human-oriented and machine-oriented controlled languages, discussing in particular the feasibility of a loosely defined controlled translation environment for web content, and tries to assess its impact on Internet-based MT services.

3. CONTROLLED LANGUAGE: HUMAN-ORIENTED VS. MACHINE-ORIENTED APPROACHES

A controlled language can be defined and classified according to one basic feature, namely whether it is human-oriented or machine-oriented (see Huijsen 1998; Møller 2003; O'Brien 2003; Reuther 2003; Nyberg et al. 2003). While the former type of controlled language is aimed at improving comprehension and readability by humans (e.g. non-native speakers of a language), the latter usually intends to make computational processing easier (e.g. for reliable parsing). These two approaches may share common traits and may overlap in some respects (e.g. insofar as they aim to reduce the amount of ambiguity and complexity found in written texts), but usually the differences are made very clear and explicit, depending on the purposes and applications for which a controlled language is developed.

This paper tries to bridge this gap by making particular reference to the Internet environment, and exploring the extent to which authoring guidelines primarily aimed at improving the readability of on-line material based on the reading patterns of Internet users can also have an impact on the subsequent application of on-line MT services. This perspective will serve the purpose of investigating whether general largely language-independent usability-oriented stylistic features also provide more MT-friendly input (cf. Bernth & Gdaniec 2001), thus representing a form of loosely defined controlled translation environment for web content.

It is certainly not realistic to expect that all monolingual websites adopt prescriptive linguistic conventions aimed at improving the

performance of on-line MT services, e.g. drafting the content of their virtual pages in some form of highly constrained controlled language. It would, however, seem reasonable that websites wishing to rely on Internet-based MT systems to disseminate their originally monolingual content in a variety of languages follow at least some basic style and formulation guidelines to improve and maximise the success of MT technology, while at the same time meeting the needs and expectations of Internet users who read on-line documentation.

As a consequence of adopting a more MT-friendly writing style for the original monolingual content of the website concerned, visitors with different linguistic backgrounds would have more chances to effectively use on-line MT for a facilitated navigation and comprehension of the translated web content. Along these lines, the paper will contend that some useful authoring guidelines to create MT-friendly on-line texts can be derived by looking at the writing style of textual web content that aims at increasing the degree of usability of Internet sites.

4. A BRIEF INTRODUCTION TO USABILITY AND ITS IMPACT ON THE LANGUAGE OF ON-LINE CONTENT

In its most abstract and general meaning, the concept of "usability" can be applied to any product or artefact that is designed to be used by humans (cf. Jordan 1998). At present it is often employed in the description and evaluation of software applications, and is very popular in connection with Internet sites (in this case it is specifically referred to as "web usability" - see for instance Nielsen 2000; Krug 2000; Visciola 2000; Postai 2001; Nielsen & Tahir 2001)[2]. The notion of web usability is closely associated with those of user-friendliness and ergonomics, whose governing principles are very similar.

In practice, implementing web usability principles into the design of an on-line application or Internet site acknowledges the importance of a user-centred approach, trying to make the interaction of the user with a website as smooth and successful as possible. In particular, whenever websites rely on the presence of text displayed on their pages to guide the users' interaction or to show them some information, the overall degree of usability largely depends on the style of the language in which the web content is written, viz. the extent to which it lends itself to easy comprehension for human users in the on-line environment.

This, in turn, crucially affects how successful the subsequent exploitation of web-based MT services applied to the input documents

concerned can be. The remaining part of the discussion is focused on the stylistic and linguistic properties of textual content that increase the degree of usability of Internet sites. Since on-line machine translation of entire web pages primarily involves dealing with text found on a website, some interesting connections will be established between the authoring guidelines for texts of highly usable websites on the one hand, and some broad language-neutral recommendations that aim at making input more easily tractable for translation software on the other, also taking into account common reading patterns in the on-line environment.

5. HIGHLY USABLE WEBSITES EMPLOY PLAIN LANGUAGE: IMPLICATIONS FOR ON-LINE MT

Explaining how plain language can enhance the level of usability of a website, Nielsen (2000) identifies a number of clear guidelines aimed at promoting a user-centred presentation of textual web content, defining what writing style should be preferred (or avoided) in highly usable websites:

> use simple sentence structures. Convoluted writing and complex words are even harder to understand online. The use of metaphors should also be limited, particularly in headings. Users might take you literally. Humor should be used with great caution on the Web. [...] Avoid puns, however, because they won't work for international users who may not be overly familiar with your language. (Nielsen 2000:111-112)

Authors of web content, then, are encouraged to adopt standard language without deviant or excessively creative structures, if the style of the texts they write is to contribute to the overall usability of the website. In fairly prescriptive terms, Nielsen seems to be giving a clear recipe that would also help to create input that is likely to improve the success rate of on-line MT systems.

As a matter of fact, general recommendations to keep a straightforward and simple sentence structure and to avoid long-winded style are certainly applicable to texts that are to be fed into an MT system, to a large extent irrespective of the particular language combination that is considered. Similarly, it is well known that MT engines have difficulty in dealing with language phenomena such as neologisms, metaphors, puns and humour (especially due to their culture-related nature).

It is interesting to note in passing that such instances of creative, innovative and unpredictable language use can also be problematic - even

though for different reasons and to a much lesser extent - for human translators. This situation reveals that the translation of phenomena such as metaphors or humour (e.g. jokes or funny anecdotes) is hard due to the linguistic and cultural operations that are necessarily involved and inherent in the nature of such translation processes. Even more reason, then, to avoid exposing on-line MT services to such language phenomena, if their performance is expected to be reasonably successful.

Some other recommendations along the same lines provide a specific focus that is more directly relevant to the machine translation of on-line texts published on monolingual web pages. Whilst reviewing what writing style should be preferred in order to successfully apply on-line MT to texts authored for a website, O'Connell (2001:ev) emphasises that "MT earns higher fluency marks on short sentences than on long sentences; aim for about 20 words per sentence".

Other practical suggestions put forward by O'Connell include, among others, avoiding the use of passive verbs whenever possible and splitting long sentences into separate self-contained clauses, so as to minimise the amount of possible ambiguity in the text. The discussion proposed by O'Connell is focused on monolingual source web documentation in English, but to a large extent the same guidelines to write MT-friendly input would in principle apply to other source languages as well.

Context-specific recommendations that bring pragmatics into the picture are also given, and they deserve particular attention here, since they involve a slightly more specific and technical dimension, compared to the advice given in Nielsen (2000). As a matter of fact, they refer particularly to the subsequent use of web-based MT to translate on-line text contained within websites:

> Jargon on a Web page risks mistranslation. It poses serious threats to adequacy and fluency. Such terms may not be in the system's lexicon. Worse still, they may be there, but associated with another, more common, meaning. Use the simplest words that tell your story. [...] Be careful when using words that change meaning with domain. [...] To improve adequacy, avoid idioms. They can lose their meaning in a literal translation. (O'Connell 2001:ev)

5.1   *Scannability of textual web content and on-line MT for gisting purposes*

Insofar as the reading process in the on-line environment is largely based on hypertextuality, it is essentially non-linear, as opposed to what happens with most traditional printed, paper-based texts such as newspapers,

magazines and books (it should be noted in passing, however, that some printed material like e.g. encyclopaedias, dictionaries and quick reference works in general tend to represent exceptions in this respect).

As a rule, Internet users very often take advantage of links to navigate the Web, so as to move around from one page to another of the same Internet site, or even to visit some external websites. As a result, when web-surfers come across on-line texts they typically follow non-linear threads with very unsystematic and fragmented browsing patterns that cannot be pre-determined or predicted in any way.

In this process, written text found on websites is typically scanned on the computer screen, rather than actually read in detail: "79 percent of our test users always scanned any new page they came across; only very few users would read word-by-word. [...] Skimming instead of reading is a fact on the Web, and it's been confirmed by countless usability studies" (Nielsen 2000:104). As a result of such unsystematic browsing patterns, some portions of on-line text are completely ignored by web-surfers: "Often, users who are scanning text will read only the first sentence of each paragraph" (ibid.: 111).

Taking this factor into account, Nielsen (2000:104) recommends to write on-line text and arrange its layout on web pages in such a way as to encourage what he calls the "scannability" of web content, due to the fact that "users tend not to read streams of text fully. Instead, users scan text and pick out keywords, sentences, and paragraphs of interest while skipping over those parts of the text they care less about".

An even more explicit comment by another author goes along the same lines: "What they [people] actually do most of the time (if we're lucky) is *glance* at each new page, scan *some* of the text [...]. There are usually large parts of the page they don't even look at" (Krug 2000:21). The importance of this point is closely related to the role played by the textual information that web pages contain, thus being relevant to the subsequent use of on-line MT services to obtain their multilingual translation.

This typical behaviour of Internet users with extremely fragmentary reading patterns proves that thorough and detailed reading is not common on-line. This observation tends to reinforce the assumption that the use of on-line MT services can effectively help web-surfers who intend to grasp a general understanding (i.e. an indicative translation for skimming or gisting purposes) of monolingual web pages whose text is written in an unfamiliar language, since accurate word-for-word reading of web content does not occur often.

5.2 *Patterns of on-line browsing and usability-oriented writing style*
On the whole, the recommendations given by Krug (2000), Nielsen (2000) and O'Connell (2001) concerning how to write texts for highly usable websites do not seem to go into much technical detail, as far as the subtle stylistic and linguistic issues involved are concerned. This is not surprising, since the guidelines summarised above are primarily aimed at web-designers, who are not generally trained in linguistics and may not be able to appreciate linguistic subtleties.

More complex textual devices or discourse strategies may in fact be added to the potentially problematic areas for MT processing that have already been mentioned, in order to provide a sharper focus on themes that involve advanced linguistic awareness. These will be linked both to key web usability-related considerations and to the issues raised by the typical browsing patterns of Internet users identified above.

Since on-line texts published on websites tend to be quickly scanned rather than read in detail and following a linear sequence - as happens most of the time on the Internet according to Nielsen's and Krug's arguments - in the interest of web usability it would seem preferable not to use some of the complex devices that aim at increasing the cohesiveness of written texts, such as ellipsis and anaphora.

As a matter of fact, the interpretation of verbal ellipsis or anaphora (also known as resolution, for instance when the correct reference or antecedent of a personal pronoun needs to be assigned to the intended entity by the reader) most often entails reading at least at supra-sentence level, or it may even be necessary to refer to previous paragraphs in a long text to grasp the references.

This is of course very impractical when scanning web pages on the Internet, since the reading pattern is in general highly fragmented and unsystematic, as suggested by the claims presented above. As a result, looking for clues to disambiguate an anaphoric reference in earlier sections of a self-contained text would prove extremely difficult and undesirable, especially if the various fragments of on-line written material that the user quickly scans happen to be scattered across a number of web pages linked to each other.

Similarly, insofar as they refer implicitly or ambiguously to some opaque textual antecedent, ellipsis and anaphora also account for potential stumbling blocks in the performance of general-purpose MT systems (including of course web-based services). In-depth discussions of the technical difficulties presented by anaphora resolution are presented in Mitkov (1999) and Mitkov (2002). There is no space to discuss the ensuing

implications in detail here, but suffice it to point out that usability-oriented style guidelines devised in accordance with typical reading patterns on the Internet seem to closely resemble indications aimed at drafting MT-friendly input, e.g. regarding the automatic processing and resolution of phenomena such as anaphora and ellipsis.

6. BRIDGING THE GAP BETWEEN HUMAN-ORIENTED AND MACHINE-ORIENTED CONTROLLED LANGUAGE

In summary, for the purposes of this paper it is interesting to emphasise the high degree of overlap between the style aimed at producing on-line texts that increase the usability of websites on the one hand, and some of the generally acknowledged specifications or provisos that can dramatically improve the results of deploying MT on the other. In this respect, it should be noted in particular that the considerations outlined above with reference to both the style of usable textual information and MT-friendly web content seem to be to a very large extent of a language-independent nature.

Even though it is recognised that there is a need for more empirical evidence to support these preliminary results, in principle monolingual web content drafted according to usability-oriented principles seems more likely to be successfully processed by on-line MT services, as has for instance been discussed with respect to sentences with a simple structure and limited length, avoiding the use of devices such as anaphora and ellipsis, etc. This scenario seems to give rise to a form of loosely defined controlled translation environment for web content.

Usability-oriented writing style is intended to benefit the readability of web content in the first place, taking into account the habits and expectations of human Internet users who access websites, and their typical browsing patterns. This paper has tried to show that at the same time guidelines and recommendations aimed at writing textual content for highly usable websites seem to constitute a form of viable controlled translation environment, insofar as they can also improve the performance of on-line MT services.

In conclusion, then, when input is drafted according to usability principles, a writing style initially geared towards making texts more easily accessible and readable to humans in the on-line environment could also help to create monolingual material that is more likely to favour the successful exploitation of web-based MT services.

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NOTES

1. Some popular on-line MT services cover a wide variety of language pairs and are available at the following URLs: http://babelfish.altavista.com (Babelfish), http://www.freetranslation.com (Freetranslation), http://www.teletranslator.com (Gist-In-Time), http.7/translate.google.com/translate_t (Google Translate BETA), http://translation.lycos.com (Lycos/Systran), http://www.reverso.net (Reverso), http://tr.voila.fr (Voila). All these websites have been accessed and are available on-line as of 30 January 2004. For a more complete picture, see Hutchins et al. (2004), which provides a comprehensive listing of MT systems and on-line services that translate Internet and web content, as well as of systems that have been "developed specifically for translating electronic documents on the Internet such as electronic mail, webpages, chat discussions, etc." (ibid.: 4).

2. A number of interesting resources devoted to web usability can be found on the Internet. The following URLs offer information on the topic: http://www.useit.com (website maintained by Jakob Nielsen), http://www.bohmann.dk, http://www.usabilityfirst.com. All these websites have been accessed and are available on-line as of 30 January 2004.

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