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READING WITH AN ELECTRONIC GLOSSARY

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ABSTRACT: Reading texts in a foreign language is sometimes a frustrating experience for people who need the information in the text but lack proficiency in the language. The purpose of this paper is to describe an electronic glossary that was used with a group of 55 undergraduate students. The paper summarizes the microcomputer program that was written to create the glossary, the preparation of a bilingual word list and the experiment that was conducted to test the electronic glossary. The results show that students read the passages faster and understood them better when they used an electronic glossary instead of a traditional bilingual dictionary.

1 INTRODUCTION

The widespread use of microcomputers in different parts of the world has expanded the use of English, not only through traditional means, where text is printed on paper, but also through electronic means, including cases where text is displayed on the computer screen. Examples of these video-generated texts are instructions to use different software packages, journal abstracts from compact disk databases, messages from the electronic mail, news items from on-line databases, etc.

These texts are usually read by the specific programs that generate them. Typically, the reader is allowed to go back and forth in the text, search for specific information, download the whole text to disk, or have it printed on paper. A problem faced by many users of these different text sources, however, is understanding the information printed on the screen, mainly because they lack a functional command of the English language. The little meaning they get from the text is arrived at through a slow and painful process of word deciphering, sometimes at a frustrating level of comprehension.

The purpose of this paper is to describe an electronic glossary that was devised for these users and experimentally used with a group of undergraduate students. The idea in creating the glossary was to offer the students an instrument that allowed them not only to get more meaning from the text printed on the screen but also get it faster than by traditional means. The assumption was that, by making language more comprehensible, learning would be ultimately enhanced. What follows is a brief description of the steps taken in creating the software, preparing the bilingual

glossary and testing it on a group of students.

2 THE ELECTRONIC GLOSSARY

Video-generated texts have both advantages and disadvantages over text printed on paper. The two main disadvantages seem to be poor video resolution and lack of portability. The quality of the video image on most computers is relatively poor when compared to the high definition of paper printing, and computers are still too cumbersome to be comfortably carried around. Price is also mentioned in favor of paper, although the difference is rapidly disappearing as more and more data are being cramped into ever smaller spaces.

While computer screens compare unfavorably with paper in terms of resolution, they offer some advantages over paper in terms of improving comprehension, mainly when the resources of the machine are fully taken advantage of. In general, students are more motivated to read when they use a computer (Cato 1989), develop better word-recognition skills (Weber and Henderson 1989), and get higher comprehension scores (Reinking 1988). Unlike a text printed on page, the computer-mediated text can be

automatically linked to other texts or different parts of the same text. Any word, phrase or sentence printed on the screen can be cross-referenced to any other segment without any visible mark or footnote to disturb the reader - but which is immediately available when accessed by the user.

This invisibility probably makes the electronic glossary, as proposed here, more helpful to the student than traditional dictionaries. It does not stand between text and reader, but is hidden behind the text, leaving the reader always closer to what is being read. The reader does not move from the context of the text to the context of the dictionary, as it happens when looking up a word traditionally.

The electronic glossary is extremely fast; it does not take any noticeable time to provide a definition or translation. The word or phrase is searched by the program itself, allowing the reader to move back and forth over the text and getting help while the segment is still being read.

The electronic glossary can discriminate the search and present the reader contextualized information, pinpointed to a specific

segment of the text. The search is done by the program itself, screening out irrelevant information and offering specific assistance.

The idea behind such an approach to computer-mediated text is associated with the Hypertext concept, which is basically a non-linear way of handling information with computers, linking the visible text on the screen with information hidden behind it. A survey of the existing Hypertext packages for MS-DOS machines, however, showed that the available programs, although they offered some sophisticated features, lacked others that were important for the writing of a functional glossary.

Among these important features, the following were regarded as essential: (a) ability to create and automatically access a relatively high number of glossary entries; (b) simultaneous presentation of both the passage being read and the glossary entry, avoiding popped-up windows that covered the text; (c) ability to handle both phrases and word endings, solving problems such as finding the singular form for a word in the plural or an idiomatic expression for a verb presented in the passage.

The first step was then to create a program to run the glossary,

starting from the assumption that all the problems presented above could be solved. The process of designing and writing such a program involves a lot of technicalities, which will be skipped here. The result, which will be briefly described, is a glossary-writing program that allows the user to read a text on the screen with the help of the glossary. It works like a simplified Hypertext package where the links to the corresponding entries are automatically accessed as the cursor moves over the text.

It was designed to work on any IBM text-compatible computer with 640K of memory and one drive. Printer, color monitor and hard disk are optional, but taken advantage of, if available. The program is menu-driven, help is context-sensitive, and the instructions can be configured to six languages.

Basically, the program allows the reader to load any text file into memory, and then read it with the help of the glossary, which is automatically accessed as the cursor is moved over the screen. If the word or phrase is found in the glossary, a translation is instantly printed at the bottom of the screen.

Along with the idea that grammatical information should be

associated with the items in an electronic glossary (Subirats-Ruggeberg 1989), plural forms, regular verb endings, degree of adjectives, and common suffixes of the English language are automatically dealt with by the program, which is usually able to sense whether the text being read is written in that language.

There is also a merging facility, where different parts of the same glossary can be put together and sorted. The purpose is to facilitate group work, so that the writing of a glossary can be turned into a classroom project, for example.

The program can also generate multiple-choice items, using the text printed on the screen in combination with the entries from the glossary. The purpose is just to test knowledge of contextualized vocabulary. The items are created, presented and evaluated automatically.

The electronic glossary proposed here was devised with a specific purpose in mind - to help users understand information printed on the computer screen - and is not intended to replace traditional dictionaries. While it is discreet, fast and context-sensitive in the computer environment, it becomes extremely limited if transferred

to paper.

3 THE BILINGUAL GLOSSARY

The second step, after creating the software, was selecting the items that should make up the bilingual English-Portuguese glossary. The decision was to produce a basic general purpose glossary that could be used as a kernel for the development of more specialized glossaries.

The inventory of the items to be included was based on existing lists (West 1953; Hindmarsh 1980; Sinclair 1988) and on frequency counts obtained with specific software (Chandler 1989). The main criterion for inclusion was frequency in general, followed by frequency in scientific texts. Words which have the same spelling and similar meaning in both English and Portuguese were discarded (e.g.: animal, circular, software). Common word endings such as regular plural forms, verb forms and degrees of adjectives were ignored since they could be handled by the program.

Frequent phrases and idiomatic expressions (e.g., at least, a great deal, take off) were included as individual entries.

Although the program allowed 8,000 entries, the final list amounted

to less than 5,000 items. This is small when compared to a medium-sized dictionary, but bigger than the traditional lists proposed for intermediate students (West 1953; Hindmarsh 1980). Also the fact that identifiable cognates between English and Portuguese were not included in the list but are automatically displayed by the program makes the list bigger in practice.

4 TESTING THE GLOSSARY

There are some important differences between an electronic glossary, as described here, and a traditional dictionary. In traditional dictionaries the search is done by the reader, turning pages forward and backward until the entry is found. In the electronic glossary the search is done by the program itself. The traditional dictionary assumes some knowledge about the morphology of the language by the reader, who has to reduce inflected words to their base form before looking them up in the dictionary; the electronic glossary incorporates these morphological rules. The traditional dictionary makes a distinction between author and reader; the electronic glossary merges both: at any moment, any entry can be added, deleted, or updated by

either the original author or the end user. The traditional dictionary is text-independent and has to provide generic information about each item; the electronic glossary is sensitive to the text displayed on the screen, and can provide information that is, to a certain extent, directly related to that text.

While these differences apparently favor the electronic glossary against the traditional dictionary, other important differences do favor the traditional bilingual dictionary. The greatest refers to the quantity of information provided for the reader, both in terms of number and size of entries. A medium-sized bilingual dictionary usually offers more than 30,000 entries; the proposed electronic glossary is limited to a maximum of 8,000, reduced to 5,000 in the study reported here. The size for each entry in a bilingual dictionary is usually some lines long; the electronic glossary restricts the entry to just some words.

The research question raised here is how this limited electronic glossary would compare to a traditional bilingual dictionary in helping the reader get the meaning of an authentic text. In other words, how would quality, represented by speed of access and

selective search, compensate for lack of quantity, expressed by a limited body of entries.

Two hypotheses were raised in the study: The first was that, all other things being equal, readers with an intermediate knowledge of English would understand an authentic English passage better using the electronic glossary than using a traditional bilingual dictionary. Better understanding would be defined as the ability to get more idea units from a passage. This would be measured through a translation task.

The second hypothesis was that intermediate students of English would read an English text faster with an electronic glossary than with a traditional bilingual dictionary. This would be tested by simply recording the time taken for doing the tests.

4.1 Subjects and Instruments

Fifty-five undergraduate students in Computer Sciences were selected for the study. These students were enrolled in two courses in English for Specific Purposes (ESP), and all had hands-on experience with computers.

A study of their previous grades in the Department, combined with

a short language proficiency test and an informal interview about their previous experience of English outside the University, showed that most students were at the pre-intermediate level, 3 were practically beginners, and 9 were at an advanced level. Among these 9, two had lived more than one year in English-speaking countries.

A reading comprehension test was prepared to measure the subjects's ability to extract meaning from a text. This test, in five different versions, was based on typical news items, published by a Cambridge newspaper. These news items included the following topics: the death of a television soap star, a power blackout in Cambridge, a car accident, a case of food poisoning, and the arresting of three shoplifters. It was assumed that no specific previous knowledge about the topics would be necessary to understand the passages. Although there were references to local people and institutions that were unknown to the subjects, the structuring of the information followed the same rules of the newspapers published in the students' community and should offer no special difficulty. The passages were all authentic and,

although restricted to the first paragraphs, could be read as a complete text.

4.2 Procedures

All the tests were administered during the subjects' regular classes. The comprehension test was administered in two modes: one using a traditional dictionary and the other using the electronic glossary. Each subject did both of them, using different passages. To account for the problem of test wiseness, half the subjects did first the traditional dictionary mode, while the other half did first the electronic glossary mode. All the passages were equally distributed between the two modes.

The subjects were asked to translate the passages into Portuguese, using either the bilingual dictionary or the electronic glossary, if they found it necessary. Time was controlled by asking the subjects to write it down when they started the test and when they finished it. The tests were administered at the beginning of the semester. The subjects were told that the tests were part of a research project and that the results would not affect their grades. They were assured, however, that they would benefit by doing their

best, because the results would be used to plan the activities for the semester. All the subjects seemed to be equally motivated to complete the test in either the traditional dictionary or the electronic glossary mode.

The test using the traditional dictionary was administered in the classroom. The dictionaries used were all bilingual and included both desk and pocket dictionaries. Since most dictionaries were brought by the students themselves, it is assumed that most students were familiar with the dictionaries they used in the test. The others used dictionaries borrowed from the University library.

The test using the electronic glossary was done in a computer laboratory, using nine IBM-compatible machines. The program was previously loaded and each subject was briefly introduced on how to move the cursor with the arrow keys, which was all they had to do in the computer if they wanted find out the translation for a given word in the text. Since the subjects were familiar with computers, this seemed to offer no difficulty for them.

Each subject had been randomly assigned to two of the five passages that had been prepared. When they did their first

translation task, either in the laboratory or in the classroom, they received two test sheets, signing both and returning the one not related to the test being taken at the moment. The first sheet was then used for the first test, leaving the other for the other mode. The procedure allowed full control with both the different texts and the two modes, so that all passages were equally distributed between the traditional dictionary and the electronic glossary.

For correcting the tests, each of the five passages was divided into idea units and then given to two scorers. The instruction was to grade the translations along the idea units. There was a maximum of points for each idea, but the scorer was free to decide on how to penalize the mistakes inside each idea unit. The test sheets were totally shuffled and the scorers had no information about the subjects' identity or mode of testing (traditional dictionary or electronic glossary). The inter-judge reliability was .89. The score for each test was the mean between the two scores.

4.3 Results

The scores were statistically analyzed in terms of difference between means, considering both performance in the two modes

(traditional dictionary versus electronic glossary) and the time taken for doing the test. Table 1 summarizes the results in terms of performance.

TABLE 1 - Performance in the comprehension test, using a traditional bilingual dictionary and the electronic glossary

	Traditional	Electronic	Difference
Mean	75.01	86.81	11.80
SD	21.93	11.56	

These results show that the subjects had a good performance in both the traditional dictionary and the electronic glossary modes, retrieving, on the average, 80 per cent of the idea units. When they used the electronic glossary, however, their performance was significantly better. The 11.80-point mean difference (Table 3) is highly significant from a statistical point of view ($p = .00014$). The pattern was consistent through all the five passages, with scores that were always higher in the electronic glossary mode. It was

also noticed that the difference grew consistently with the more difficult passages or the weaker subjects, which suggests that if the subjects were less proficient in English the mean difference between the traditional dictionary and the electronic glossary would be even higher. This can be seen in Table 4, where the negative correlations (r = -.89 for the passages and r = -.67 for the subjects) show that the lower the scores the greater the difference.

These results indicate that the electronic glossary not only brought up the scores but also reduced dispersion between subjects; the standard deviation difference between traditional and electronic is significant at the .00002 level (F=3.60). In other words, weaker students, who needed more help, seemed to have profited most from the electronic glossary.

Table 2 summarizes the results in terms of time. On the average, the students spent 17.34 minutes doing the traditional dictionary mode. In the electronic glossary mode, time was reduced to 12.5 minutes. The 4.83 difference is statistically significant beyond the .0001 level (Table 3).

TABLE 2 - Time taken for the comprehension test,

using a traditional bilingual dictionary and the electronic glossary

	Traditional	Electronic	Difference
Mean	17.34	12.50	4.83
SD	4.39	3.76	

TABLE 3 - Differences between means in performance and time, using paired observations

	Performance	Time
Mean	11.80	4.83
SD	22.47	4.82
t	3.89	7.43
d.f.	54	54
p	=.00014	<.00001

TABLE 4 - Correlations between mean differences for the traditional and electronic conditions between passages and between subjects.

	Mean differences	Mean differences

	X passage scores	X subjects' scores
Pearson r	-.89*	-.67*
N	5	55

* Significant at .05

Considering that part of the time, in the comprehension test, was taken up for the writing of the translation, it can be argued that the mean difference would be even higher if the subjects were using the electronic glossary in real-life situations, where they would not have to supply written evidence of their comprehension.

4.4 Discussion

During the test procedure, special care was taken to produce data as reliable possible. Five different passages were used, each equally distributed between the two modes (traditional dictionary versus electronic), to avoid any possible linkage between one mode and an easier passage. Order in doing the tests was also controlled by having one half of the subjects taking first the traditional dictionary mode and vice-versa, so that test-wiseness from one mode to another was balanced.

During the scoring procedure, care was taken to hide the identity of the subjects and the mode under which each test was taken. The scorers knew they were grading tests translated with either a traditional dictionary or an electronic glossary, but they had no way of knowing which test sheet belonged to which. Considering that grading translations is rather subjective, two scorers were used, each receiving the test sheet without any remarks from the other.

In transcribing the raw data everything was carefully double checked. After the data had been typed in, the final print produced by the statistical package was compared with the original grades provided by the scorers, the time used in the test, and the mode under which it was taken. A checksum procedure--adding the data for each variable first from the test sheets, then from the computer printout, and finally comparing the totals--was also used. In every step of the study, care was taken to produce results as reliable as possible.

The findings unmistakably favor the electronic glossary as more useful to help the student comprehend an authentic text. All other things being equal, intermediate students of English get more

meaning from a text, and get it faster, if they use an electronic glossary that exploits the speed and context-sensitive search allowed by computers.

An informal protocol conducted with a beginner who scored 3 points in the traditional dictionary test, after working on it for 23 minutes, and 86 points in the electronic glossary, in 11 minutes, also supports the conclusion advanced by the statistical analysis:

> I got lost with the dictionary. When I managed to find the meaning of one word I had forgotten the meaning of the one I had looked up before. In the computer I could go back and forth, and see the meanings of the words. I could understand the passage [translated from the Portuguese].

The fact that these results were obtained with a general purpose electronic glossary indicate that better results would probably be obtained with specific glossaries. These glossaries, geared to a specific area, group of texts, or even individual passages, could be used to produce comprehensible output for early intermediate students using authentic passages. One possibility is a collection of reading passages with a specific glossary. This kind of electronic textbook, compared to a traditional reader, is cheaper,

easily customized to the students needs, and relatively easy to produce, test and improve.

5 CONCLUSION

The purpose of this paper was to describe some theoretical and practical aspects involved in the preparation and use of an electronic glossary with undergraduate ESP students. It seems that electronic glossaries have a potential not only for retrieving information from text printed on the screen but also for learning the language.

The experiment, designed to test the performance of the electronic glossary as compared to traditional bilingual dictionaries, showed that the electronic glossary was superior, both in the number of idea units it allowed the subjects to retrieve from the text, and in time it demanded for the comprehension. Using the electronic glossary, the subjects read the passages faster and got more meaning from it. The difference was greatest with subjects whose language proficiency was lowest.

One of the current basic assumptions about language development is that we acquire a language by interacting with

comprehensible input. Providing comprehensible input for early intermediate students, using authentic material, is sometimes very difficult for the classroom teacher. An electronic glossary, as proposed here, may be an interesting way of transforming certain texts, which are otherwise out of the reach of the students, into comprehensible passages, and thus enabling, with practice, acquisition of the language.

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