

Hypertext in cognate-language learning

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Abstract This paper reports on the results of and experiences gained from a project to investigate and evaluate the use of *hypertext* as a tool for developing CALL systems. The type of CALL system implemented was to some extent influenced by the desire to experiment with hypertext. Its novel features seemed to indicate that it would be ideal for the development of a *cognate-language learning* package i.e. software which would aid the development of reading ability in a foreign language based on the knowledge of a related language. Accordingly, a package was developed which provides the 'same' prose passages in French and Spanish (with English normally operating as the first language). A reader is able to browse in one of these languages, trying to understand the meaning by either interpolating between cognate words or by moving between the identical passages of two (or even three) of the languages.

Keywords: CALL; Cognate-language learning; French; Hypertext; Reading; Spanish

What is hypertext?

The concept of hypertext is not new. In 1945, Vannevar Bush, President Roosevelt's chief scientific advisor, propounded the idea of large databases which would mimic the brain's ability to access information quickly and intuitively by association (Bush, 1945). The idea was taken up, extended and refined in the 1960s by Douglas Englebart and Theodore Nelson (Englebart, 1963; Nelson, 1967). (It is Nelson who is generally accredited with coining the word hypertext.) A review and survey of applications is given by Conklin (1987). Hypertext may be simply described as:

- non-linear or non-sequential text i.e. segments of text which have cross-references or connections to other related segments and which allow the user to move freely between these segments, or alternatively as
- a database in which the information is linked via associative connections — information may be selected by association, rather than by conventional indexing.

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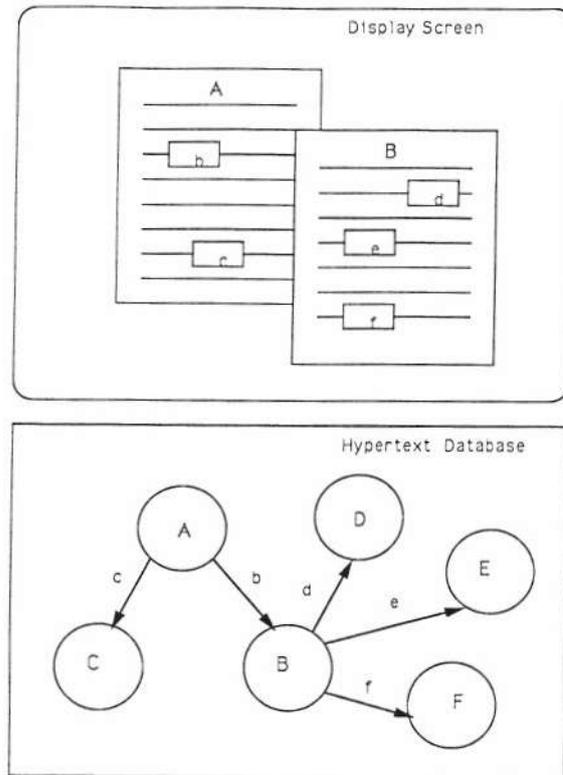


Fig.1. The correspondence between display screen and hypertext database. Text pages (A and B) on the screen are stored in database nodes (circles). When link b in page A is activated, the corresponding link in the database is traversed, and the contents of node B are displayed on the screen.

A physical representation of a hypertext document is a complex, possibly hierarchical, network, with 'islands' of information being connected by various pathways. Almost by definition, it is difficult to represent it in traditional linear form. In the jargon of hypertext, an island of information is termed a *node*, which can contain a single word, or a whole chapter, or any other segment of text. The nodes are interconnected via computer-supported *links*. It is this multiple linking capability which allows the non-linear organization of information. Typically, information from each node is displayed in a screen window whenever that node is accessed i.e. a connecting link is traversed by the reader (Fig. 1).

The concept of hypertext, which was expanded to include graphics, has been further extended to include sound and video — the result now being known as *hypermedia*. The option of adding sound and video to text provides the use of hypermedia in teaching and training situations with exciting possibilities.

Thus in a multimedia *hyperdocument*, the reader does not necessarily have to follow the normal fixed sequential path of reading but may branch off down many possible avenues of exploration and discovery, following the embedded links at whim. For example, in a hyperdocument on eighteenth century French history, the user might branch off to explore information on the French Revolution, and then branch off again to investigate information specifically on Versailles, and hence be presented with video or graphics of the palace plus a running commentary in written or spoken French. The reader may even think of connections not thought of by the implementer of the hyperdocument and the possibility sometimes exists of allowing the reader to add further links as wished.

Other modes of accessing a hyperdocument include searching for a given word or navigating the nodes using a graphic browser — a graphic display of the nodes and links in the system and the reader's position in the network, which allows the reader to specify which node he wishes to access directly.

If visionaries such as Nelson are to be believed, the whole concept of serial reading will be profoundly changed by hypertext, with consequences for the material production of magazines, books, etc. (Nelson, 1980).

What is cognate-language learning?

If one essential threshold in acquiring a foreign language is the ability to read general texts, so the cross-over point is when the reader can advance at such a speed as not to forget the sentence structure while understanding lexical, morphological or other items. On the other hand, texts with excessive explanations disrupt smooth reading. The ideal is information that:

- is optional;
- contains many layers and facets;
- is specifically about well-defined points in the text; and
- is many times quicker than a printed dictionary or grammar.

Towards achieving a minimal reading fluency outside a purely scholastic context, all methods that work may be considered legitimate, whether based in the language being acquired or not. The richer the preparatory principal and the follow-up stages of foreign text reading, the more likely meaning is to be transmitted.

Cognate-language learning is a method which helps the development of foreign language *reading* ability based on knowledge of a related i.e. cognate language. Using supplied support information and knowledge of the cognate language, a reader is able to build up an understanding of the foreign language text. Another group of researchers have already used conventional techniques for implementing cognate-language learning methods (Hammond & Simmons, 1987).

Cognate-language learning is an unfamiliar phrase, undoubtedly for two reasons. First, all second-language learning is 'cognate' to some extent. However similar or different the new language, the learner must to a certain degree relate it to his experience of his first language. But secondly,

this sort of approach has seldom been employed in second foreign-language teaching to the present date. It is true that the learning of Latin has often been justified in terms of the 'knock-on' effect for learning other Romance languages. However, because teachers and students of one foreign language will very rarely all have another common foreign language, in practice each new language is learned afresh. To put it briefly, until now there has not been a material framework which could put to use the undoubted repetition in learning a new foreign language, and this has meant a great deal of redundant effort.

The current project provides the 'same' prose passages in French and Spanish (with English normally operating as the first language). A reader is able to browse in one of these foreign languages, trying to understand the meaning by either interpolating between cognate words or by moving between the identical passages of two (or even three) of the languages and using the system-supplied information.

Hypertext would seem a natural vehicle for facilitating the learning of a cognate language. The acquisition of language by any method involves much lateral thinking and many analogical or illogical processes. This is perhaps doubly so in cognate-language learning. Also, any software for language teaching should ideally cater for the widely varying strategies of any user. This is the strong point of hypertext — it allows the 'complete' provision of information on many different levels and in many different forms, with multiple cross-referencing embedded in the information.

HYPERCARD

The project was implemented on an Apple Macintosh II computer using *HYPERCARD*, Apple's hypertext development package (Goodman, 1988). (The software will also run on a Macintosh SE or Plus with a few modifications.) The classic Apple ethos — mouse, icons and pull-down menus — permeates the whole *HYPERCARD* development environment. In *HYPERCARD*, information (be it graphics, sound or text) is placed in *cards* — one card comprising an arbitrary amount of information of up to one screenful. (In *HYPERCARD*, a card is the term for a hypertext node.) A set of cards on the same topic is known as a *stack*. Cards and stacks may be linked together via *buttons* — a button being a visible icon anchored at a specific position on a card. Clicking the mouse on a button causes the link to be traversed and the information on the card at the end of the link to be displayed on the screen. In order to move through *HYPERCARD*, in other words, the user clicks on however many successive buttons as necessary. An associated programming language, *HYPERTALK*, is available for developing advanced features. *HYPERTALK* is a very high-level language being relatively close to basic English and easy to use. In addition, *HYPERCARD* contains many tools which enable a developer to build a hypertext document easily and quickly. For example, there are many templates of cards and buttons which may be freely used and modified to create new applications. Many fonts of text and many styles of graphics are

available. Sound and video may also be added — the easy use of text combined with graphics and sound clearly helps the human-computer interface.

HYPERCARD operation is divided into five levels with each level allowing access to more facilities and capabilities than the last. Essentially, the first level (browsing) is for users of a *HYPERCARD* application, the other levels for developers of applications:

- **browsing**: finding and viewing information on the cards and stacks. Thus a user is able to navigate through an application, but is unable to make changes;
- **typing**: adding and changing information on the cards. A user is able to modify a card. This might be useful in applications requiring the 'writing of notes in the margin'.
- **painting**: creating graphics on the cards;
- **authoring**: creating buttons and links between cards;
- **scripting**: creating programs ('scripts') using *HYPERTALK*.

The software package

The heart of our system is a set of 'identical' natural language texts. Each of these texts is spread over a series of cards. For each language there are three levels of text — beginner, intermediate and advanced. The reader may choose the language and level required by clicking on the appropriate icon (i.e. *HYPERCARD* button). The first part of the passage is then shown. A reader may now browse through the text, moving from screen to screen, alternating between languages and accessing the system-supplied information as desired, all at the click of a mouse button (see for example, Figs. 2, 3 & 4).

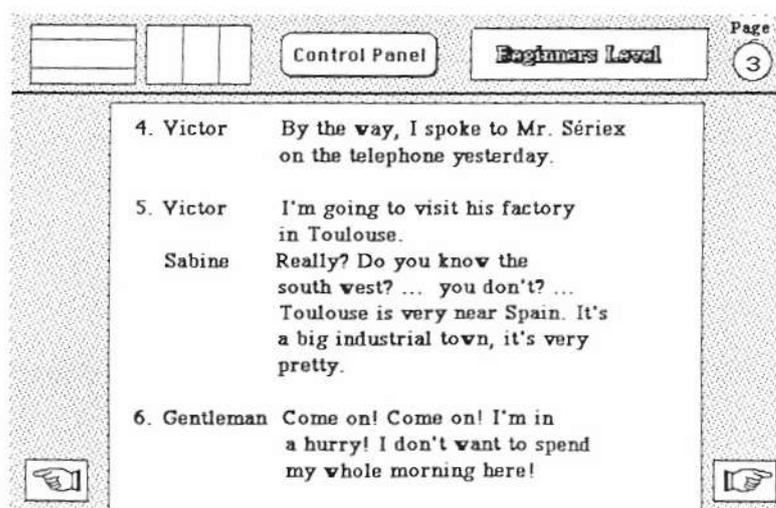


Fig.2. A fragment of the English beginner's text.



Fig.3. A fragment of the French beginner's text.

Time constraints dictated that the system-supplied information for the passages should be focused on a narrow domain. We chose to concentrate on verbs, as the richest part of speech, and the one showing greatest formal variation in the languages concerned. Clicking on any verb in any passage causes an information card to be displayed (Fig. 5). (In terms of implementation, each verb is surrounded by an invisible button: clicking on the verb is done by clicking on this button.) This card gives grammatical information on the verb form including tense and person, and contains a number of buttons accessing further data on the verb and enabling the user to view the verb highlighted in the context of the passage in any of the three languages.

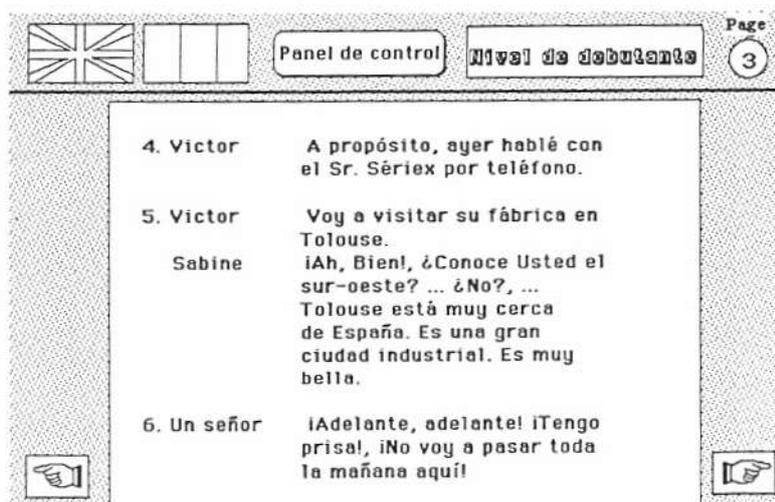


Fig.4. A fragment of the Spanish beginner's text.

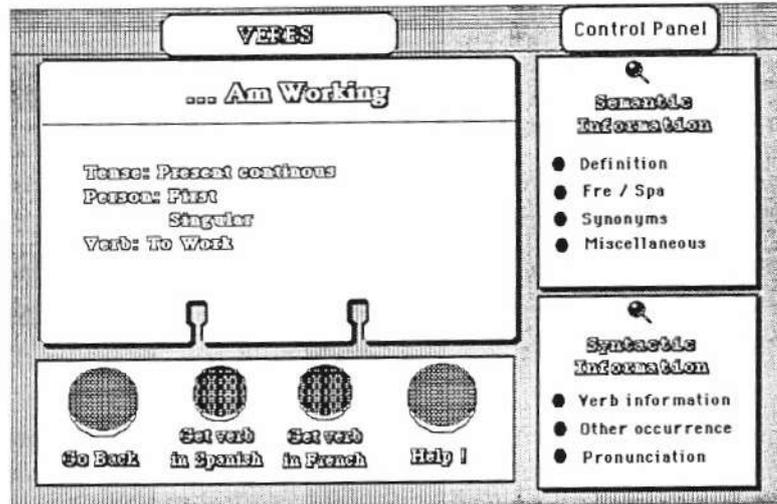


Fig.5. A verb information card.

The further data are divided into semantic and syntactic categories. The semantic information comprises the following cards:

- synonyms for the verb;
- dictionary definition of the verb in the *same* language;
- dictionary definitions of the verb in the other languages;
- miscellaneous 'tit-bits' of information — the aim being for the user to have a mental tag on which to hang his knowledge of the verb. The origin of the word, its use as a noun, interesting expressions it forms part of, are examples of the information supplied in this section.

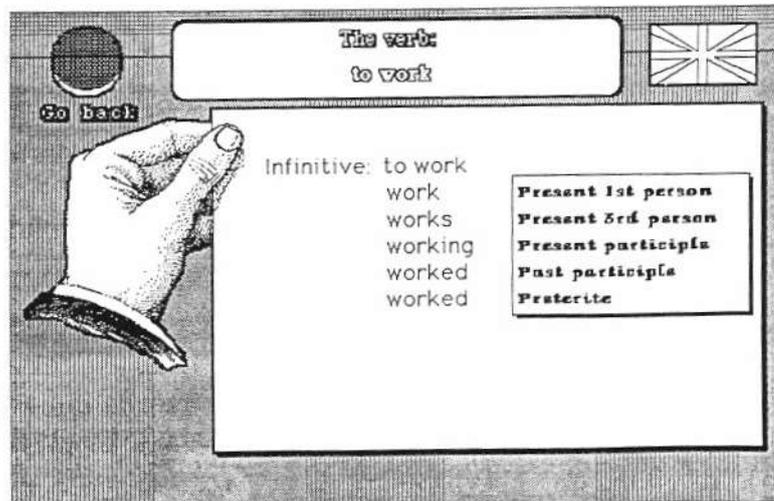


Fig.6. Extra syntactic information available for a verb.

The syntactic and morphological information consists of cards containing:

- the principal parts of the particular verb (Fig. 6);
- other occurrences of the verb (including different forms) in the passage - the aim being for the user to gain maximum information about its use in context. For example if 'am working' is the verb, then forms in the passage like 'aren't working' and 'worked' can be highlighted sequentially throughout the passage;
- occurrences of *other* verbs in the same form, so that the user can observe regularities in, for instance, the form of the past participle. For example, corresponding to 'am working', verbs in the passage like 'am taking' and 'am going' would be highlighted;
- pronunciation of the word using an adapted transcription system.

Other options available besides the cognate-language texts are:

- **speed-reading:** the system sequences through the passage with the key words (previously identified by the implementer) being highlighted. The speed at which the passage is to be shown can be selected by the reader. In this way, the reader can obtain a summary of the information of the passage, either in the same language or in one more familiar to him;
- **comprehension test:** the reader may optionally sit a brief comprehension test on the passage. The test is organized as multiple-choice, with the reader required to click the correct answer. The questions are selected in a random order from a store of preset questions.

The reader is free to progress through the text at his own rate and to decide which extra information he wishes to see. There are no constraints on the reader — he may use any part of the package at will and is not forced to follow a predefined sequence of operations. The reader simply learns by wandering about in the *HYPERCARD* system.

Problems with hypertext

Two well-known problems associated with hypertext have been identified:

- **disorientation:** a reader may become 'lost in hyperspace'. Psychologists have distinguished two forms of lostness. Firstly, *objectively lost* — a reader has confused the links between the various nodes and cannot use the displayed references. Secondly, *subjectively lost* — a reader feels out of control. How does a reader navigate the complex network of nodes and links without becoming disoriented? Some systems provide a graphical browser or use visual effects to give a sense of direction. In our system, each card contains navigational instructions, for example, 'go back' i.e. return to previous card. A 'home-base' is also provided, the 'Control Panel' card which may be accessed from anywhere (Fig. 7);
- **cognitive overload:** the reader may be overloaded with decisions when presented with a large number of choices about which links to follow and which to ignore. Some systems have successfully experimented with an explanatory message for each link or a graphical browser to alleviate this problem.

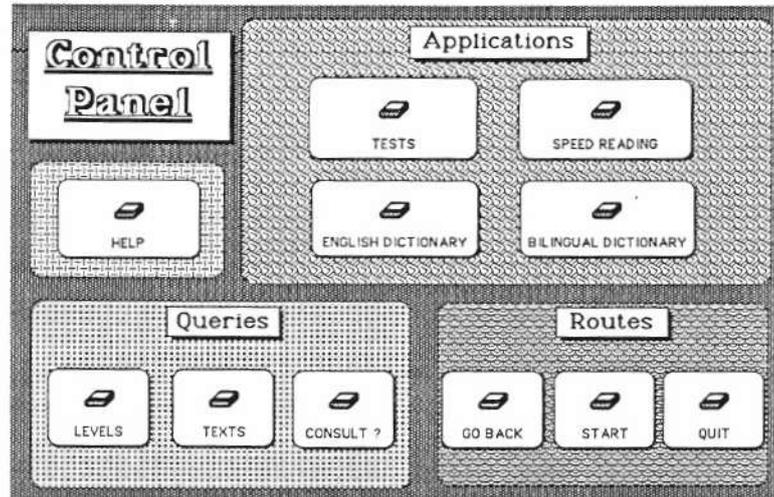


Fig. 7. Control panel for English texts

A third problem, on a different level, creates a disadvantage for the developer: the very advantage of flexibility for the reader which hypertext provides implies a huge amount of work has to go into preparing the material, even if the reader may only use part of it.

Experiences gained

The account of the experiences gained from this project will be in two parts. The first part deals with the practical experience derived by the developers from using an Apple Macintosh system with *HYPERCARD* for the development of CALL software, whilst the second will document the pedagogical experiences collected with the use of the package in the teaching process. In order to evaluate the development of a CALL package, we suggest the following (highly subjective and qualitative) criteria; and then try to provide some sort of response in the case of our own project.

- **Usability:** is the system easy to use or not? Can a novice make use of the system without much external guidance or documentation? Is the interface 'user-friendly' and consistent?

Novices have found our system friendly, and relatively easy to use and understand. The cards are not cluttered with extraneous detail. Text messages in or near any button inform the reader of the purpose of that button. To aid a confused user, a help button appears on most cards.

- **Extensibility:** is the system easy to extend? Could another cognate language, other texts or more pedagogical features be added easily? Is the system easy to maintain? It is relatively simple to add more cards and stacks to a *HYPERCARD* system. Thus more texts could be added

quite simply using the existing framework. The present system also provides the necessary templates which may be borrowed to produce new cards. Features which we would wish to add to our system are facilities to:

- provide a bookmark — to allow the reader to stop and start at will, returning him to the same place in the passage;
- monitor progress — keeping a record of which passages have been read and how the reader fared on the optional tests;
- display grammatical structure — by, for instance, displaying the major components of the sentence in a parse tree or showing the parts of speech in different colours;
- write in the margins — this may be implemented either by allowing the reader to write information into the passage card or by having superimposed 'windows';
- add further cognate languages — for example, Italian, Portuguese, Old French and Latin.
- **Robustness:** is the system thoroughly tested? The system has stood up so far in its limited use — the *HYPERCARD* environment is well-cushioned and a machine crash does not usually result from an error.
- **Responsiveness:** does the system respond to user requests in a short period of time and in the appropriate fashion?

The *HYPERCARD* system provided is especially efficient, much thought and effort having gone into its implementation, so that traversing a link is very quick. However, we found the type of Macintosh used greatly influenced the response of the system. One possible problem area stems from the heavy use of *HYPERTALK*, which is an interpreted language. It is thus slower than compiled languages such as Pascal, and this demands that large *HYPERTALK* programs should be carefully considered from efficiency angles.

- **Intelligence:** are help/explanation features available? Can the system give intelligent guidance when the user makes a mistake? Full explanatory text messages are displayed if the user attempts something which is not possible.
- **Portability:** is it possible to port the system to a new computer family without much effort?

HYPERCARD applications are not portable to non-Apple Macintosh systems. Hypertext developments do exist for other systems, for example, *GUIDE* and *HYPERHELL* on the IBM PC.

To sum up, we feel that the development of CALL software with *HYPERCARD* is really not an onerous task once the Apple Macintosh interface has been mastered. Useful packages can be quite easily generated.

The second stage of testing was on real users. A number of students of varying linguistic ability evaluated the pedagogic value of the package (i.e. does the system actually teach the user useful material or techniques?) in a simulated classroom environment. The users were encouraged to experiment with the package and roam around the different text levels to find which level best suited their own linguistic requirements. Usage of the

package proceeded at each individuals' own pace since the package was intended for self-study.

The package was reasonably well-received by the users. Many felt that it was an interesting learning experience and that, given that the package is specifically for cognate-language reading, it modestly fulfills what it set out to do. The program was judged good at providing students of different ability with the information necessary for understanding texts at various levels of difficulty. Existing features which users commented on as being particularly useful are:

- the ability to switch very quickly between different language texts;
- the ability to discover information on particular words at the click of a mouse button. Clearly this is a useful facility, especially as the user can control the amount of information displayed.

Before serious use, the package needs extending with more texts at various levels to allow the user to develop and reinforce vocabulary. The dictionaries also need extension, with the principal meanings being highlighted. Clear, concise instructions (like 'Now please read the text') and clear prompts to indicate where to click were deemed to be useful additions. Colour would be of assistance here. Synthesized pronunciation of given words would certainly enhance the pedagogic value. Given the availability of high-quality speech systems, this is not an impossibility, although such systems are notoriously hungry in disk storage requirements.

We feel that our system does allow self-study of a second language either by reference to a cognate-language or in isolation. Clearly, benefits will vary according to individual users, but we would claim that this approach can contribute significantly to understanding foreign-language texts in terms of language units more familiar to the learner.

Conclusion

The production of an impressive package in *HYPERCARD* is relatively straightforward, requiring little knowledge of computing techniques. The enhancement of text with video and particularly sound in a language learning environment may make it particularly attractive.

One advantage of this system is to potentially satisfy the different schools of thought on second-language acquisition. Those who think that there should be no reference to the native language may use the package entirely within, say, the French or Spanish mode, benefitting from the multiple features helping comprehension of the passage. Those, like the authors, who believe that European languages share many features including much vocabulary and syntax, and that this shared heritage can be exploited, will be pleased to see a system which enables transfer from one language to another. And the traditionalists, finally, who claim that adult learners, especially, operate efficiently by using their deep knowledge of their native language, often by a process of explicit translation, will also be able to use this system constructively.

It would be perfectly feasible to extend the system into an open-ended template, complete with blanks for passages, questions, etc., and also complete mono- and bilingual dictionaries, together with intelligent techniques for stripping off endings and stems, and so on. In this way, the teacher—or even the student—could feed in his own text and gain immediate feedback from studying it.

The shape of things to come?

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