



Gouvernement du Canada  
Ministère des Communications

Government of Canada  
Department of Communications

Le Centre canadien de recherche  
sur l'informatisation du travail

Canadian Workplace  
Automation Research Centre

2. **CRITTER system**  
**demonstration interface** \*

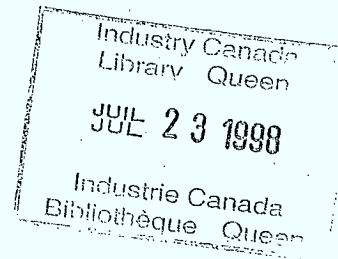


11/  
**Jean-Luc Cochard**

QUEEN  
P  
308  
.C63  
1989  
c.2

Canada

Queen  
P 308  
C63g  
1989  
c.2

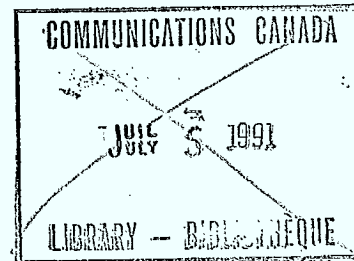


2. CRITTER system  
demonstration interface/ \*



// Jean-Luc Cochard //

Canadian Workplace Automation  
Research Centre  
Department of Communications  
Laval



September 1989

\* This project was financed by le Fonds national suisse de la recherche scientifique

Cat no. Co28-1/34-1989E  
ISBN 0-662-17270-1

The views expressed in this report are those of the author only.

\* Rapport complet en français aussi disponible.

P  
308  
C63  
1989  
212

DD 10604234  
DL 10641246

# Table of Contents

---

	Abstract .....	1
1	Introduction	
1.1	The CRITTER system.....	2
1.2	The demonstration interface.....	2
2	Capabilities of the demonstration interface	
2.1	General .....	3
2.2	The control panel.....	3
2.3	The editors .....	4
2.4	The options control panel .....	6
2.5	Translation modes	
2.5.1	Stages on the translation process .....	9
2.5.2	Blind execution .....	9
2.5.3	Step-by-step translation.....	10
3	Annotated examples.....	15
	Acknowledgements.....	32
	Bibliography.....	33

## Abstract

---

The CRITTER system demonstration interface is a computer-based component using the graphic display capabilities of SUN stations, which simplifies the use of the CRITTER system as such. Its main purpose is to illustrate the capabilities of the CRITTER system and the techniques employed in its design. This interface simulates a rudimentary version of the translator's workstation, and allows the user to graphically display the structures manipulated by the various linguistic components of the CRITTER system.

Key fields:        Machine translation, graphic interfaces.

# Introduction

## 1

---

### 1.1 The CRITTER system

The CRITTER system is a machine-aided translation program currently under development at the CWARC (Canadian Workplace Automation Research Centre) [CRITTER]<sup>1</sup>. In its current form, the CRITTER system is used to translate texts drawn from real life, i.e. agricultural market reports issued by Agriculture Canada, from English to French, and vice versa.

This system is complemented by a demonstration interface that provides an environment for the use of the CRITTER system, and simplifies the illustration of the technical principles applied in creating a machine translation program.

### 1.2 The demonstration interface

The demonstration interface is a layer superposed on the CRITTER system as such. This interface makes use of the graphic capabilities of the SUN-3 and SUN-4 workstations, and their graphic environment, SunView. The current interface is programmed in ProWINDOWS, an extension of Quintus-PROLOG, whose object-oriented approach allows the manipulation of graphic objects from SunView.

The demonstration interface plays a number of roles, depending on one's point of view. In particular, inasmuch as this interface is referred to as a "demonstration" interface, its main goal is to illustrate the capabilities of the CRITTER system and the techniques applied in its design. For that purpose, we have assigned the interface two separate secondary goals -- that of simulating a translator's workstation, and that of illustrating the various steps in linguistic processing, by graphically representing the linguistic structures handled by the CRITTER system.

In the simulation of a translator's workstation (TW), the translation system is used in a real-life context. Aside from the visual and illustrative interest of the demonstration interface, it offers the benefits of an elegant connection with the CRITTER system for submitting sentences to be translated. The design of a prototype TW raised a number of problems of an ergonomic nature. How, for example, should the station screen be configured to automatically put together a translated text, while allowing translations to be edited and conserving the original text ? How should calling the CRITTER system be made as simple and intuitive as possible ?

The other secondary role can be considered a didactic one. By graphically displaying the results of the various linguistic steps in the translation process, the interface illustrates the description of the system's capabilities by the demonstrator.

---

<sup>1</sup> Bibliographical reference



# Capabilities of the demonstration interface

## 2

---

We will use a series of printed partial or complete screen copies from a SUN station to illustrate our detailed description of all the current capabilities of the demonstration interface.

### 2.1 General

In the specific Canadian linguistic context, i.e. French-English bilingualism, it was important that the CRITTER system demonstration interface be bilingual. Thus the interface commands can be displayed in French or English. One of the system parameters allows the user to select the display language (see section 2.4, "The options control panel"). Note also that this feature called for some extra effort in programming, with the result that the list of display languages could easily be increased.

In the display of the interface commands, we have used Macintosh convention, i.e. that "..." following a command means that the execution of such commands calls up a new dialogue window. Issuing other commands will result in simple operations that require no further interaction.

### 2.2 The control panel

When the demonstration interface starts up, the screen is divided into several parts (see Figure 1):

- in the lower part, the interface control panel, comprising five separate elements : a title, an icon and three buttons;
- in the upper part, two editors, which will be described in section 2.3, "The editors"

The cow icon is the logo of the CRITTER system, and refers to the cattle market reports that CRITTER is currently being used to translate. In addition, the appearance of the cow changes depending on the stage reached in the translation process. We will return to this detail in section 2.5, "Translation modes".

The first button, "Print", issues the screen copy command. The second button, "Options...", calls up the interface options menu (see section 2.4, "The options control panel"), and the last button, "Quit", allows the user to exit from the application. Under these buttons appears an area that is reserved for messages produced by the interface, among other purposes. We will see some examples of those messages later.

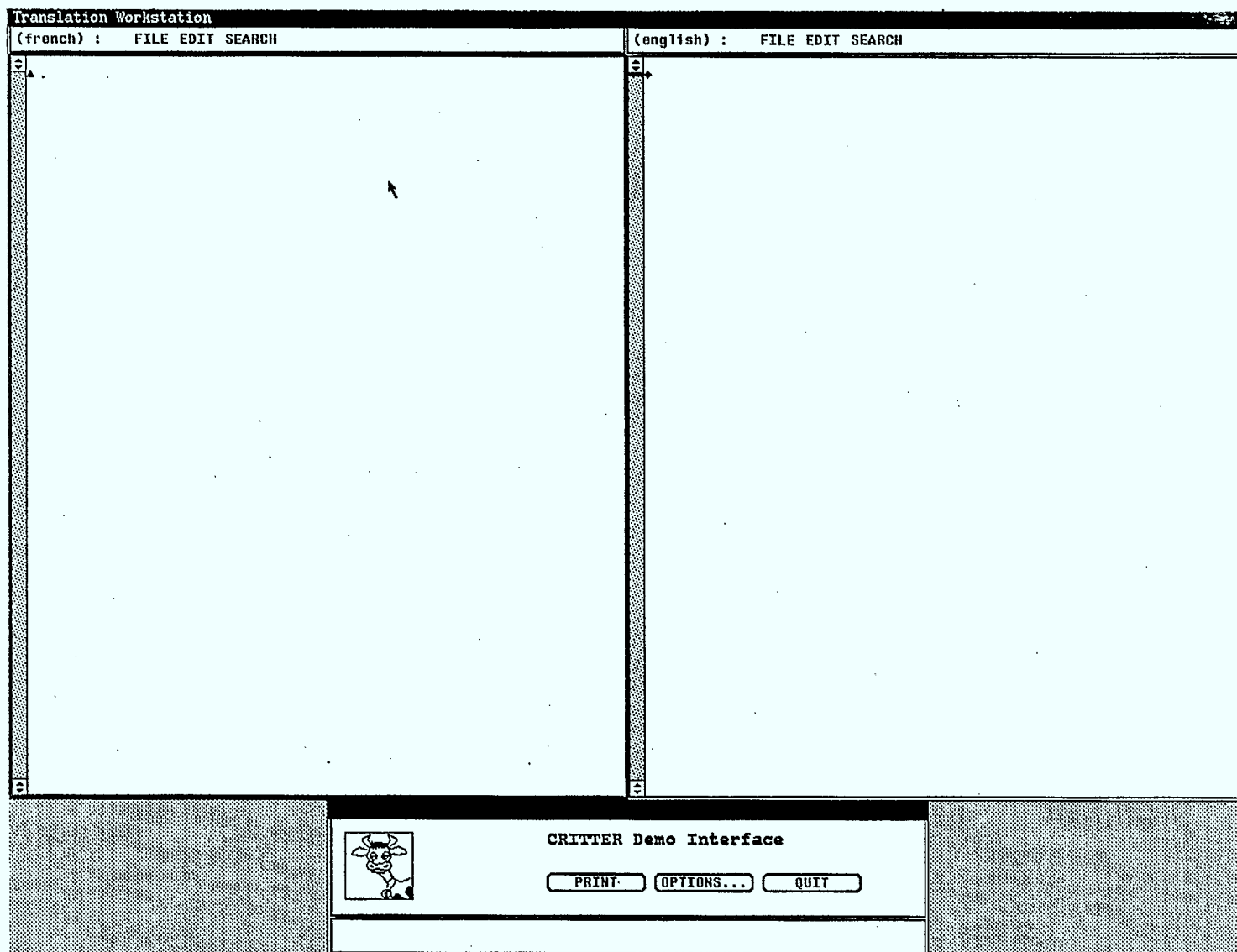


Figure 1 : Initial state of the CRITTER system demonstration interface.

## 2.3 The editors

The initial state, shown in Figure 1, gives the demonstrator access to two editors for manipulating text in the two languages handled by the CRITTER system. The left-hand editor is reserved for handling French text, and the right-hand editor, for English text. The two editors' functions are similar; in particular, the functions available through the menu bars at the top of the windows are identical. Figure 2 gives an idea of these limited possibilities. These functions are rudimentary and, in fact, have not yet been fully implemented (e.g., the SEARCH menu, in Figure 2). Despite their shortcomings, these basic word-processing functions illustrate fairly clearly the principle of how machine translation software is used.



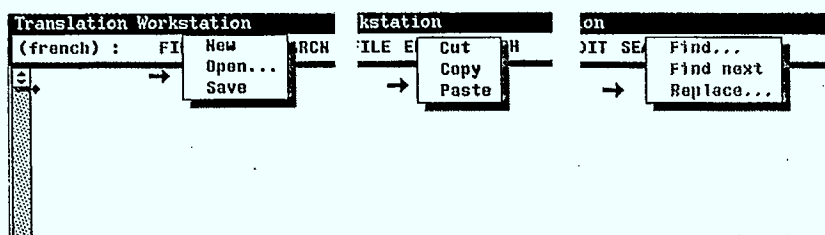


Figure 2 : List of the general functions available in each of the two editors.

The file management and editing commands are also based on Word, on Macintosh. For file management, the "New" command allows the user to erase the edit buffer and begin editing a new text. The "open..." command allows the user to load a file into the editor. The system first asks under what name it should save the contents of the buffer, if applicable (see Figure 3), and then asks for the name of the file to be edited (see Figure 4). Each operation can be confirmed or cancelled by selecting one of the buttons.

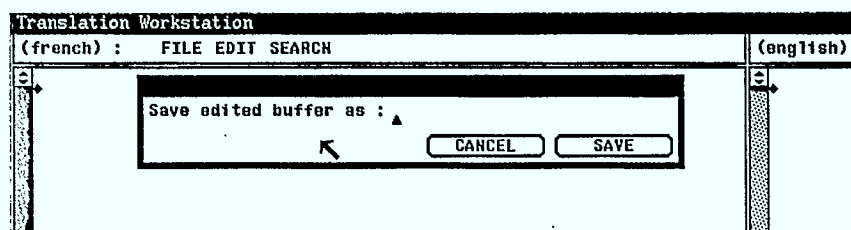


Figure 3 : Optional step allowing the user to save the contents of the edit buffer, when the "Open..." command is executed.

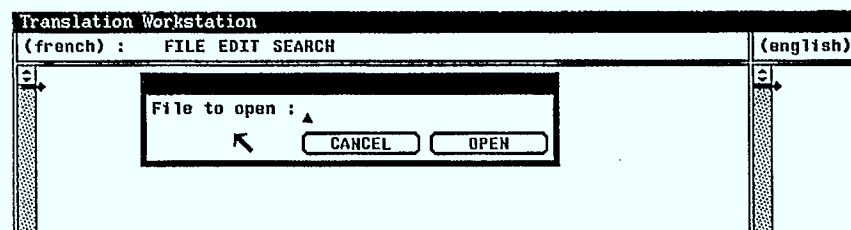


Figure 4 : The user is asked for the name of the file to be edited, when the "Open..." command is executed.

The edit commands are really universal functions, and we will not discuss them. The search commands are useful for handling voluminous texts, which does not apply in the case of this demonstration interface; thus their implementation is of secondary importance for the moment.

### Comment

In the current version of the interface, the editors offer only rudimentary word-processing functions adapted to translators' needs. We feel, nevertheless, that the principle of a pair of editors offers attractive advantages for correcting translated texts, a step that is normally referred to as the post-edit stage. The ability to display the original text (when it is available on computer-readable media) and the translation simultaneously makes a paper

version unnecessary, and eliminates the incessant flipping back and forth between a paper original version and the translated version on the screen.

In addition to these general functions there is the translation function, which appears on a floating menu in both editors. This menu is displayed when the operator selects the button to the right of the mouse (see Figure 5). The other two buttons are used to select the text. It is only because of this translation command that the interface assigns a specific language to each editor. This allows the interface to easily determine the source language when a text is submitted for translation. In its current version, the CRITTER system translates sentences. Thus, to submit text for translation from the interface, the user simply selects a sentence with the mouse and issues the "Translate" command.

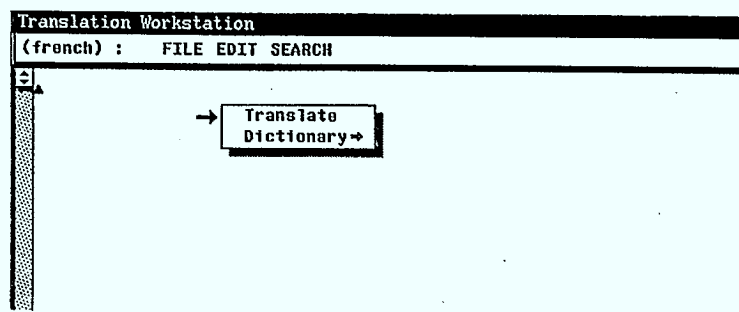


Figure 5 : Floating menu, including the translate command.

### Comment

The "Dictionary" command in the floating menu is an as-yet unimplemented feature that is to allow users to consult electronic dictionaries. This tool is part of the infrastructure of the translator's workstation , as described in [TW].

## 2.4 The options control panel

The "OPTIONS..." button on the control panel calls up a list of execution parameters (see Figure 1). The window that contains this list, the options control panel, also contains a series of buttons with the following functions (see Figure 6) :

- "SAVE" sends the current state of these parameters to a file with a predetermined name. This function means that the interface can be started up with a personalized combination of execution parameters, rather than the unchanging default parameters.
- "CANCEL" allows the user to leave this parameters modification mode; the initial values, displayed when the window was opened, will remain unchanged.
- "DEFAULT" allows the user to select the interface default values.
- "QUIT" allows the user to leave this parameter modification mode, retaining the new values of the parameters that have been changed.

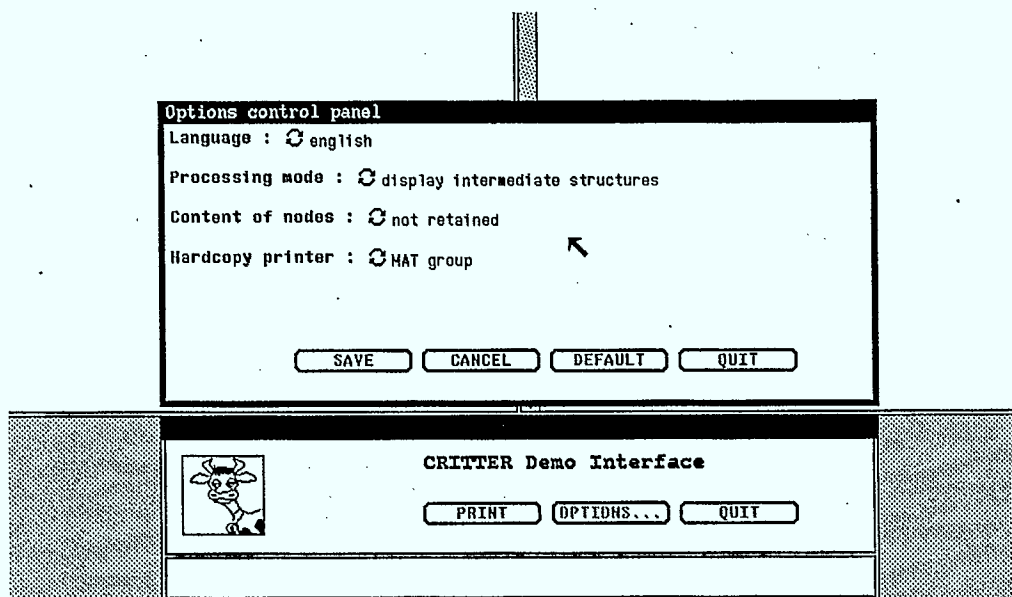


Figure 6 : Options window, displayed when the "OPTIONS.." button on the control panel is selected.

Each parameter on the options control panel may be changed in two different ways, by selecting either the button to the left of the mouse, while the cursor is close to the current value, or the button to the right. In the former case, the current value is replaced by the next value in the list of available values (when the end of the list is reached, it starts over again at the beginning). In the latter case, the system displays the list of possible values, indicating the current value with a check mark. We have selected this technique to describe the possible values of the various parameters.

"Language" (see Figure 7) corresponds to the display language, mentioned earlier. In the current, temporary version, changing this value does not result in an automatic and immediate update of the names of commands, windows, etc. But if the display language is changed and the "SAVE" button is then selected, the demonstration interface will operate in the language chosen the next time it is executed.

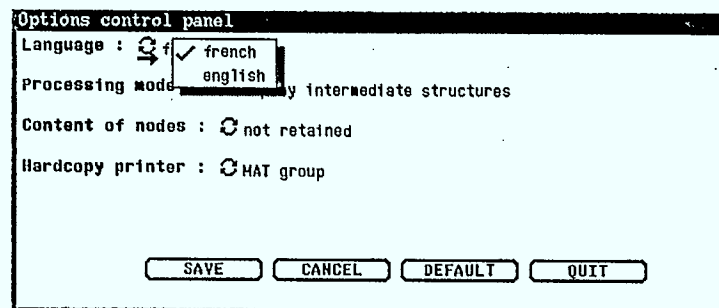


Figure 7 : Options control panel, with the list of display languages.

"Processing mode" (Figure 8) is an execution parameter related directly to the "Translate" command in the editors. Consequently, the two processing modes, "no intermediate structures", and "display intermediate structures", affect the operation of the

interface. This subject will be discussed later, in a special section on translation modes (section 2.5).

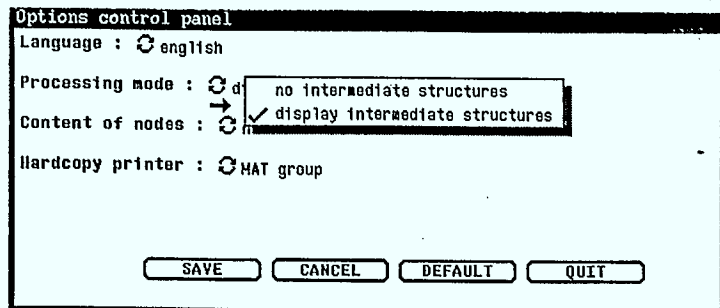


Figure 8 : Options control panel, with the list of processing modes.

There is only one possible value for "Content of nodes" at present, i.e. "not retained" (See Figure 9). This parameter refers to the graphic representations calculated in "display intermediate structures" mode. Each node of the graphic structures displayed contains more information than the simple label shown on the screen. In this version of the interface, no adequate representation procedure has yet been designed to display this information.

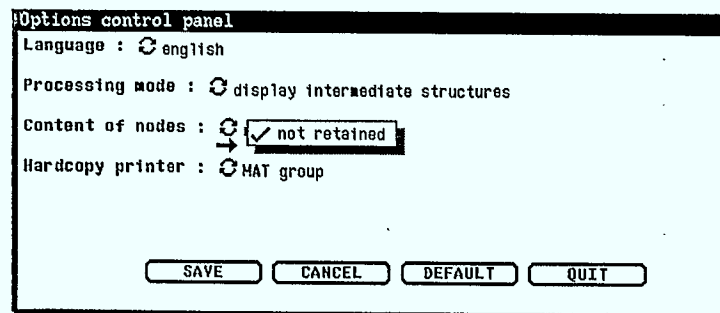


Figure 9 : Options control panel, with the sole authorized value for the content of nodes.

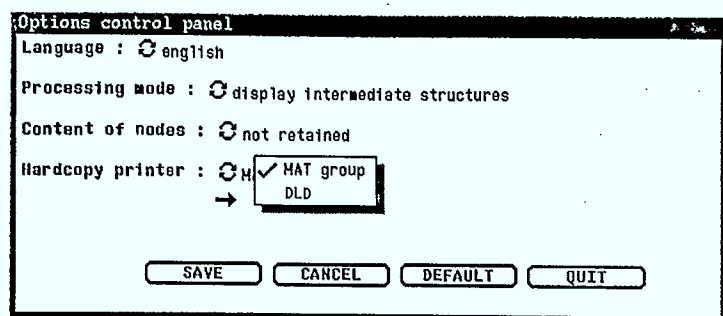


Figure 10 : Options control panel, with the list of printers.

"Hardcopy printer" (Figure 10) allows the user to specify, on the SUN system, the printer that will be used to print any screen copies.

## 2.5 Translation modes

### 2.5.1 Stages on the translation process

When the user submits a sentence to the CRITTER system by means of the "Translate" command in the floating menu of one of the two editors, the icon that appears on the control panel changes. The cow's appearance varies, indicating the stage reached in the translation process. The following is an explanation of the various images.



Initial stage; waiting for a translation request.



Linguistic processing stage; executing a CRITTER system predicate.



Processing phase in the interface; either the translation or the graphic structures are displayed.



Current operation failed; this icon is displayed for approximately two seconds, and is then replaced by the default icon.

In these picture codes, the cow illustrates the steps in a translation by the CRITTER system by chewing and swallowing a sheaf of hay. If the translation fails, the cow's vexed appearance can be taken to indicate indigestion! This humorous interaction technique makes it unnecessary to display a series of messages to keep the user informed of the phase currently being executed.

### 2.5.2 Blind execution

"Blind" translation, which is related to the "no intermediate structures" processing mode (see section 2.4, "The options control panel") is the operating mode in which the CRITTER system is intended to operate on a translator's workstation. The translator selects the text, requests the translation, and watches the translated text appear in the other editor window, as shown in Figures 11 to 13. This form of interaction with the CRITTER system is to be very simple and routine, since a machine-aided translation system will be just an additional tool in the translator's kit, aimed at simplifying his or her work.

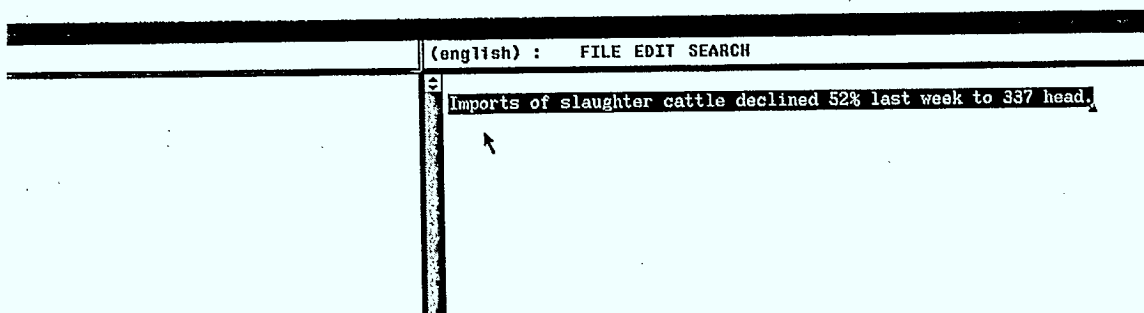


Figure 11 : Selecting an English sentence.

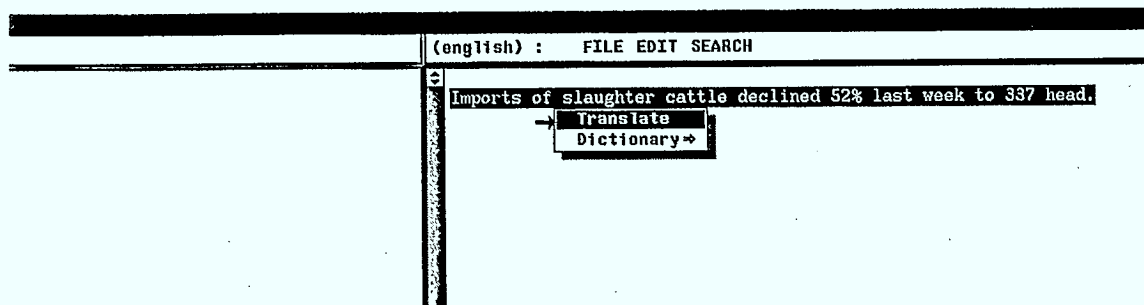


Figure 12 : Issuing the translate command for the text selected.

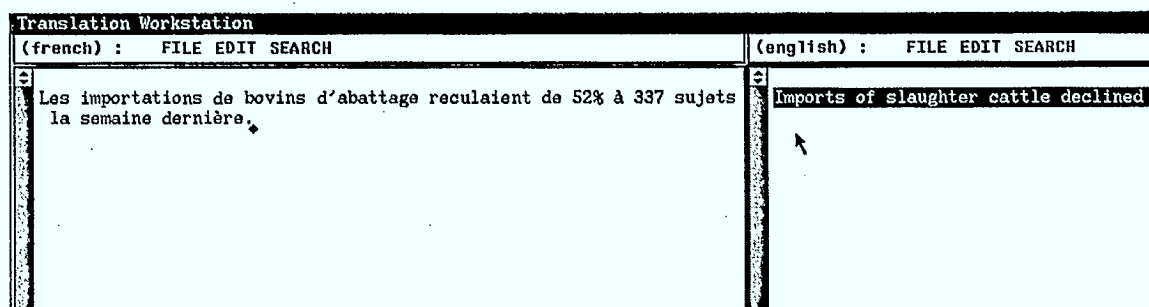


Figure 13 : Automatic display of the translated French sentence.

### 2.5.3 Step-by-step translation

"Step-by-step" translation is related to the "display intermediate structures" processing mode. This option of the demonstration interface is used to illustrate the principles and techniques applied in the design of a MAT system such as CRITTER. In this case, the general principle we have selected and illustrated is the decomposition of the translation process into three steps : analysis, transfer, and synthesis (see Figure 14). Each step is a program whose result serves as the input data for the following step, allowing each phase to be developed entirely independently.



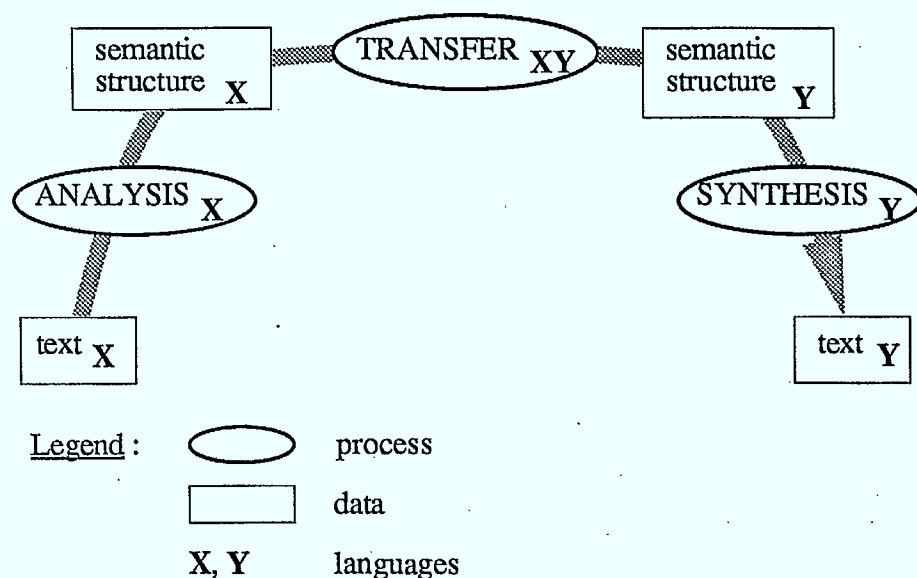


Figure 14: Schematic breakdown of the translation process.

When the "Translate" command is issued, in the step-by-step translation mode, the interface displays another set of windows (see Figure 15). The control panel still appears at the bottom of the screen, slightly modified to allow the user to work with the step-by-step translation mode. The message display area is used to display the original or translated text. The four windows that cover the top of the screen are used to display the auxiliary structures and the data between the different stages.

There is a fairly close relationship between the principle diagrammed in Figure 14 and the screen configuration shown in Figure 15. Figure 16 illustrates that relationship, portraying the syntactic structures as auxiliary structures built during the analysis and synthesis stages. Their display explains the concept of surface (syntactic) structures, as opposed to deep (semantic) structures.

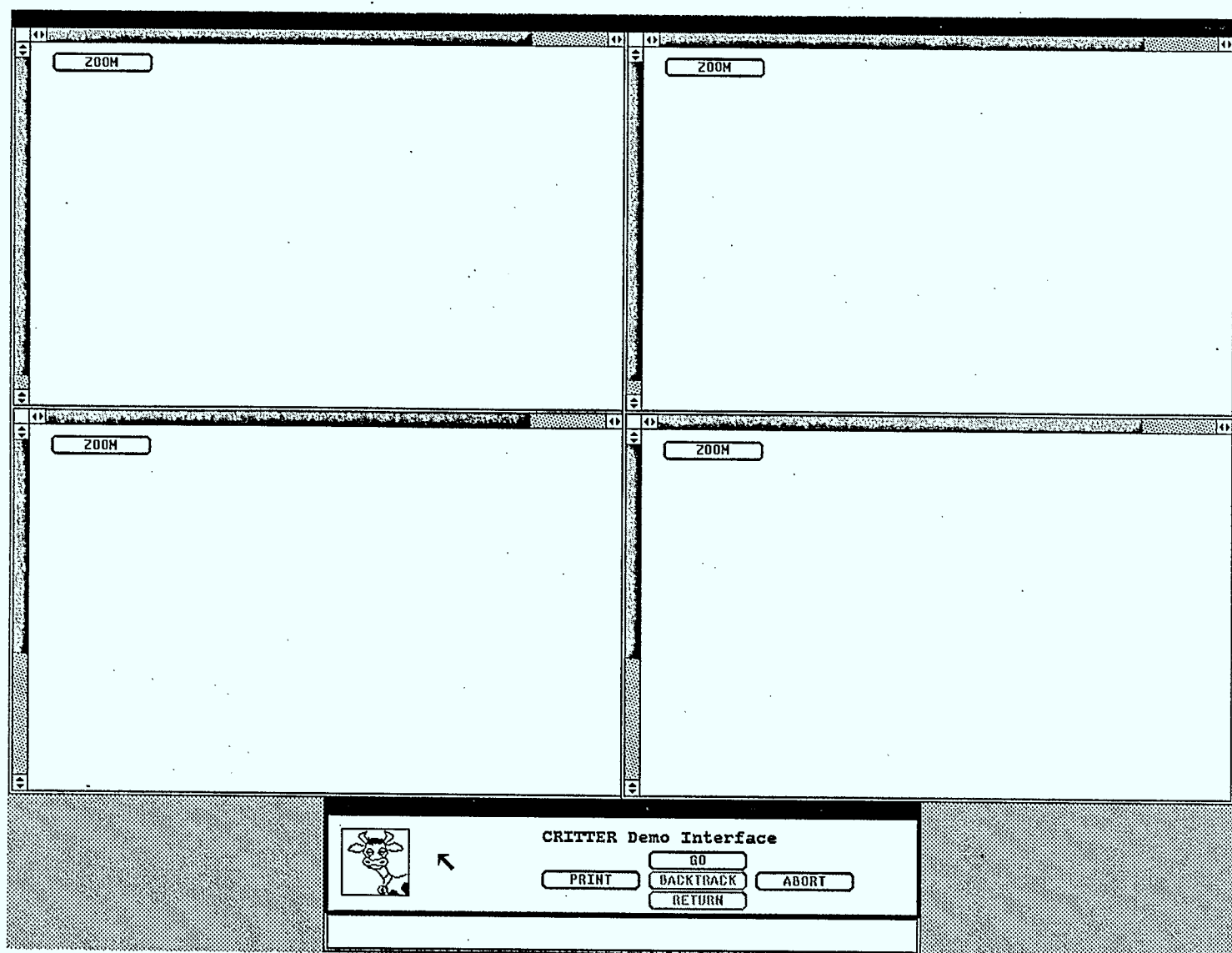


Figure 15 : Configuration of the windows for step-by-step translation.

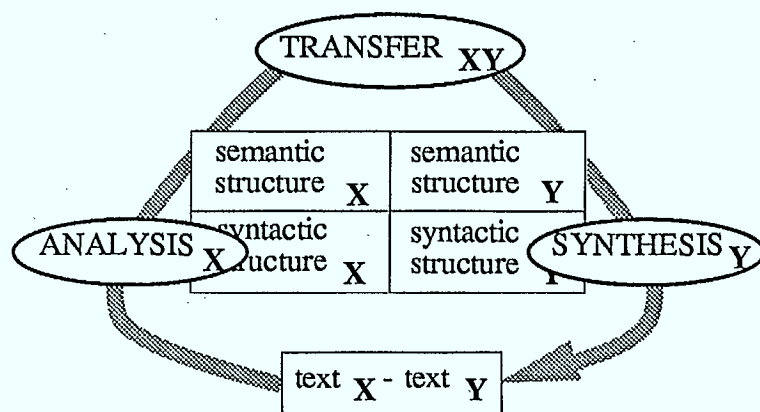


Figure 16 : Alternative representation of Figure 14.

There are two technical concepts that are also illustrated in the step-by-step translation mode : the use of a semantic structure as the only data passed from the analysis to the transfer stages and from the transfer to the synthesis stages, and the fact that the system is reversible. We will examine each of these points separately.

The transfer of data solely by means of a semantic graph is illustrated by displaying that kind of structure at the completion of the analysis and transfer stages.

The system's reversibility can be demonstrated either by translating in both directions, using the "blind" or "step-by-step" translation methods, or by means of the control buttons on the modified control panel. The configuration of the valid buttons is different at each step. Figure 17 shows the initial configuration, prior to analysis. The "PRINT" button is still used to produce screen copies. The "ABORT" button allows the user to leave the translation process at the end of any step. And finally, the only other valid button is "GO".

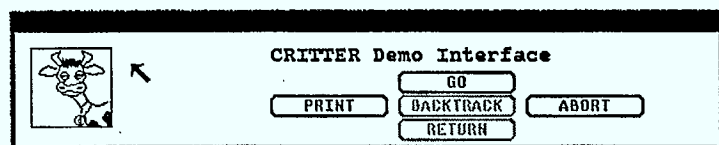


Figure 17 : Initial configuration of the panel buttons.

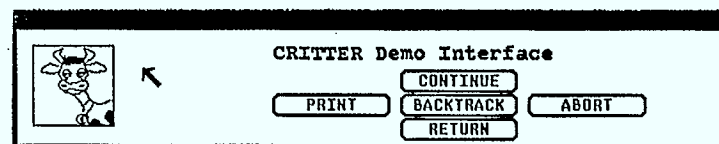


Figure 18 : Configuration of the control panel buttons between the analysis and transfer stages.

Figure 18 show the configuration after the analysis stage and before the transfer stage. At this point it is possible to "CONTINUE", i.e. execute the transfer. It is also possible to ask the system to "BACKTRACK" over the choices it made during the analysis and so reach another possible solution. Finally, it is possible to "RETURN", that is, to build a paraphrase of the original sentence, by using the result of the analysis of a text in a given language as data for the synthesis of the text in that same language. This operation is feasible thanks to the reversibility of the CRITTER system, and is illustrated in Figure 19.

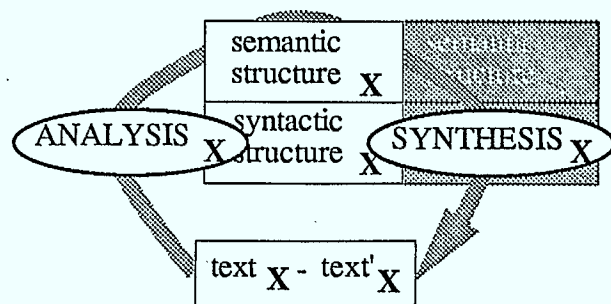


Figure 19 : Illustration of the principle of paraphrasing, as performed with the "RETURN" button.

After a paraphrase has been requested, the final phase is reached, and the screen shown in Figure 20 is displayed. The user can then select "TERMINATE", which means that he or she will be returned to the editor windows, and the paraphrase will be entered in the edit buffer. It is also possible to ask the system to "BACKTRACK".

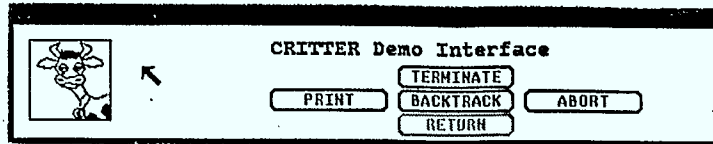


Figure 20 : Final configuration of the buttons on the control panel.

If, following the analysis, the user decides to carry out the transfer, the result is the configuration shown in Figure 21. Note that at that point it is no longer possible to "RETURN", but only to request "BACKTRACK" or "CONTINUE", i.e. to perform the synthesis.

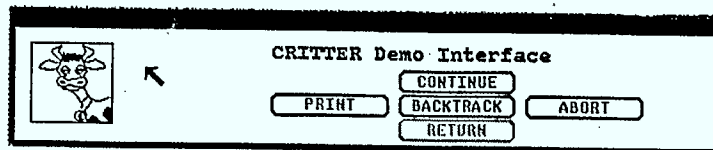


Figure 21 : Configuration of the buttons on the control panel between the transfer and the synthesis.

After the synthesis is performed, the control panel display the final configuration of the buttons (see Figure 20). If the CRITTER system cannot provide an alternative solution, when the user selects "BACKTRACK", the control panel display a special configuration of buttons that gives the user only one way to exit, i.e. with "ABORT" (see Figure 22).

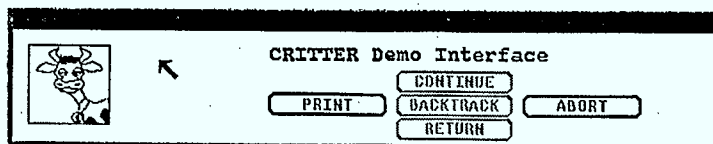
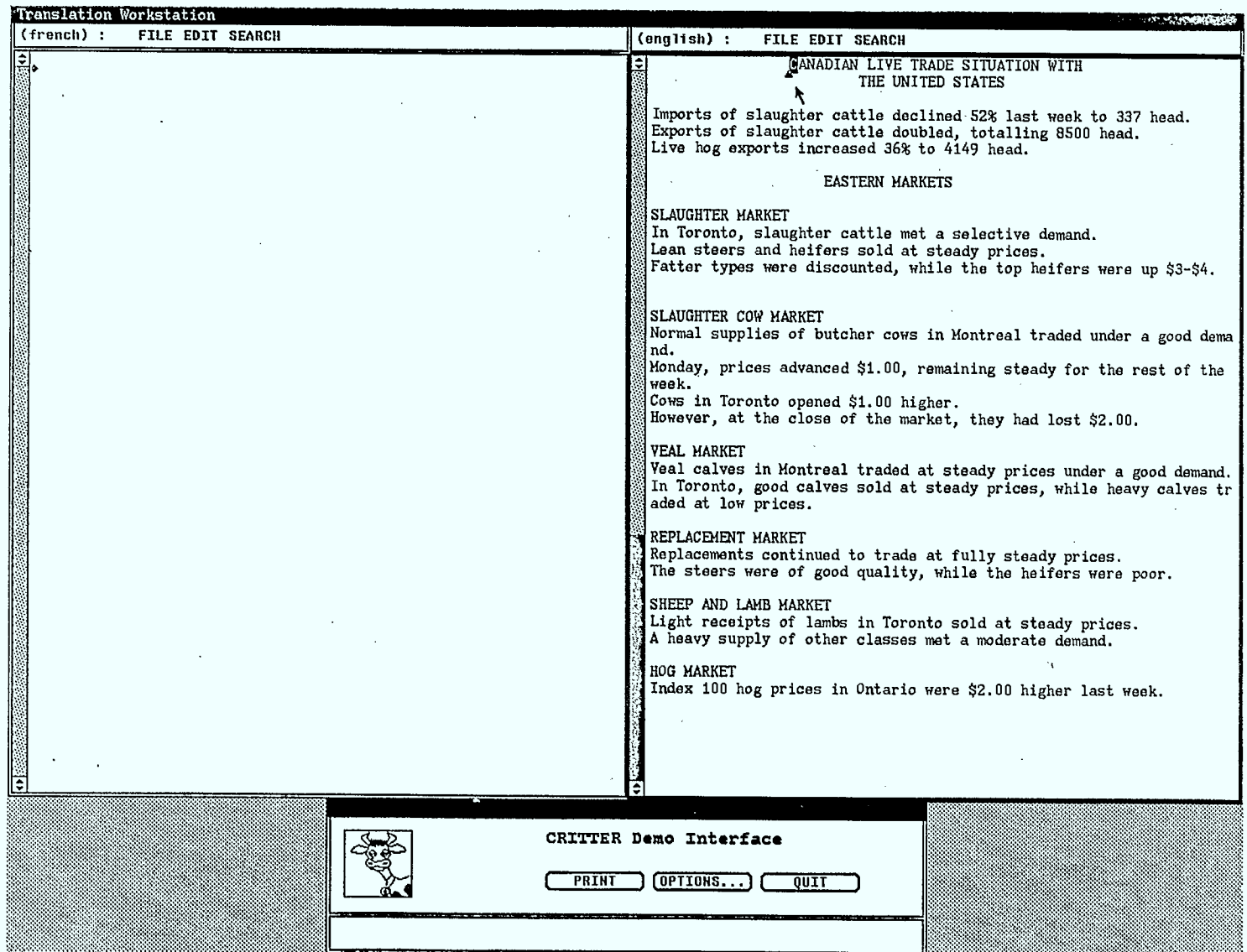


Figure 22 : Configuration of the buttons on the control panel in a failure situation.


# Annotated examples

## 3

This chapter offers a general summary of the sequence of events and comments during a demonstration of the CRITTER system, using the demonstration interface.




Screen 1 : Initial state of the interface, after an agricultural market report, in English, has been loaded.

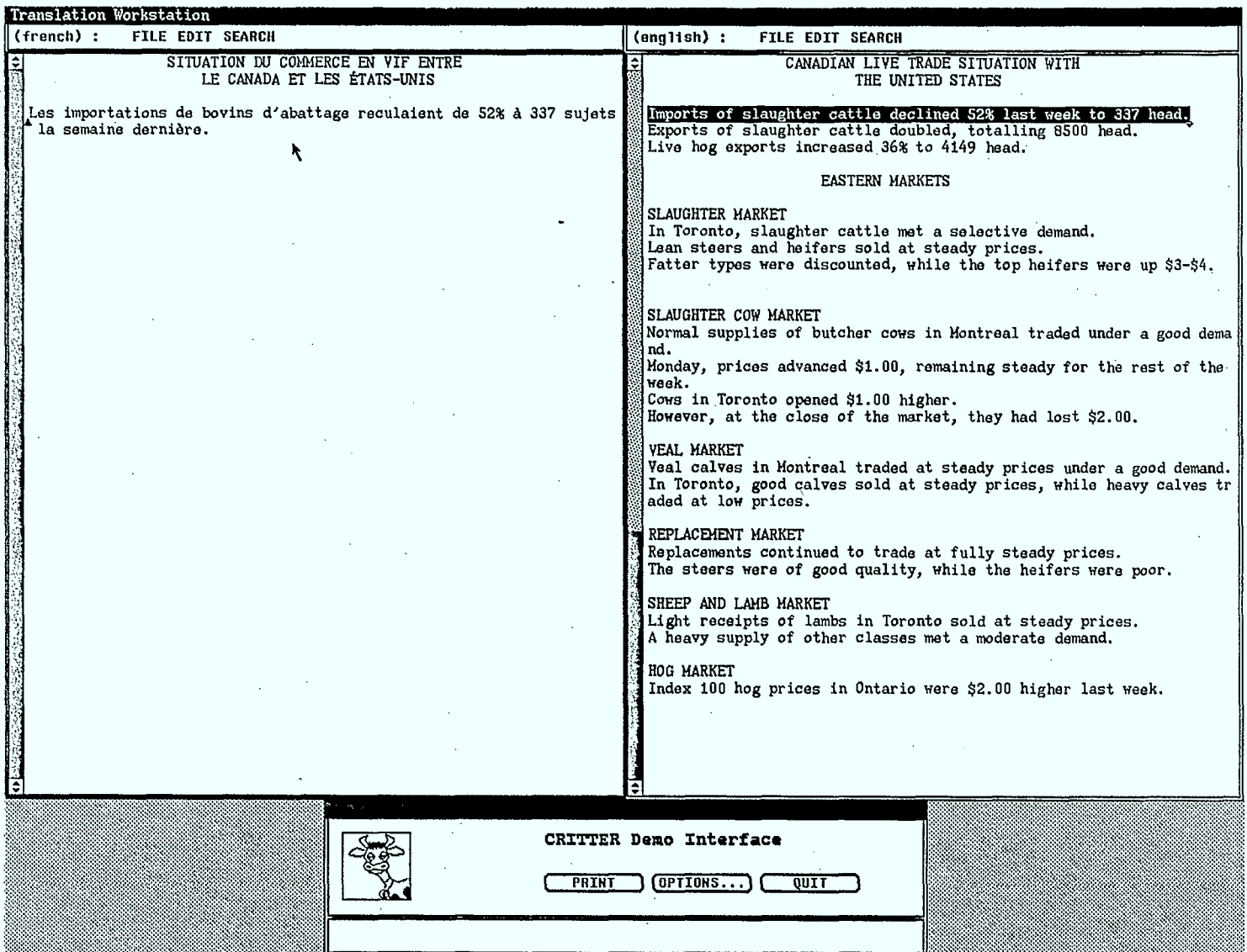
Translation Workstation	
(french) : FILE EDIT SEARCH	(english) : FILE EDIT SEARCH
<p>SITUATION DU COMMERCE EN VIF ENTRE LE CANADA ET LES ÉTATS-UNIS</p>	<p>CANADIAN LIVE TRADE SITUATION WITH THE UNITED STATES</p> <p>Imports of slaughter cattle declined 52% last week to 337 head. Exports of slaughter cattle doubled, totalling 8500 head. Live hog exports increased 36% to 4149 head.</p> <p>EASTERN MARKETS</p> <p>SLAUGHTER MARKET In Toronto, slaughter cattle met a selective demand. Lean steers and heifers sold at steady prices. Fatter types were discounted, while the top heifers were up \$3-\$4.</p> <p>SLAUGHTER COW MARKET Normal supplies of butcher cows in Montreal traded under a good demand. Monday, prices advanced \$1.00, remaining steady for the rest of the week. Cows in Toronto opened \$1.00 higher. However, at the close of the market, they had lost \$2.00.</p> <p>VEAL MARKET Veal calves in Montreal traded at steady prices under a good demand. In Toronto, good calves sold at steady prices, while heavy calves traded at low prices.</p> <p>REPLACEMENT MARKET Replacements continued to trade at fully steady prices. The steers were of good quality, while the heifers were poor.</p> <p>SHEEP AND LAMB MARKET Light receipts of lambs in Toronto sold at steady prices. A heavy supply of other classes met a moderate demand.</p> <p>HOG MARKET Index 100 hog prices in Ontario were \$2.00 higher last week.</p>
<div style="display: flex; justify-content: space-between; align-items: center;">  <div> <p>CRITTER Demo Interface</p> <p>PRINT OPTIONS... QUIT</p> </div> </div>	

Screen 2 : Illustration of the possibility of manual editing. At this time the CRITTER system is unable to translate titles, and so this operation can be performed manually.




Translation Workstation	
(french) : FILE EDIT SEARCH	(english) : FILE EDIT SEARCH
<p>SITUATION DU COMMERCE EN VIF ENTRE LE CANADA ET LES ÉTATS-UNIS</p>	<p>CANADIAN LIVE TRADE SITUATION WITH THE UNITED STATES</p> <p>Imports of slaughter cattle declined 52% last week to 337 head. Exports of slaughter cattle doubled, totalling 8500 head. Live hog exports increased 36% to 4149 head.</p> <p>EASTERN MARKETS</p> <p>SLAUGHTER MARKET In Toronto, slaughter cattle met a selective demand. Lean steers and heifers sold at steady prices. Fatter types were discounted, while the top heifers were up \$3-\$4.</p> <p>SLAUGHTER COW MARKET Normal supplies of butcher cows in Montreal traded under a good demand. Monday, prices advanced \$1.00, remaining steady for the rest of the week. Cows in Toronto opened \$1.00 higher. However, at the close of the market, they had lost \$2.00.</p> <p>VEAL MARKET Veal calves in Montreal traded at steady prices under a good demand. In Toronto, good calves sold at steady prices, while heavy calves traded at low prices.</p> <p>REPLACEMENT MARKET Replacements continued to trade at fully steady prices. The steers were of good quality, while the heifers were poor.</p> <p>SHEEP AND LAMB MARKET Light receipts of lambs in Toronto sold at steady prices. A heavy supply of other classes met a moderate demand.</p> <p>HOG MARKET Index 100 hog prices in Ontario were \$2.00 higher last week.</p>
<p>CRITTER Demo Interface</p> <p>  <input type="button" value="PRINT"/> <input type="button" value="OPTIONS..."/> <input type="button" value="QUIT"/> </p>	

Screen 3 : Selection of a sentence to translate, and issuing the translate command.




Screen 4 : The system translates the sentence, and display the result in the other editor window. This is the default translation mode, with no display of linguistic structures.

Translation Workstation	
(french) : FILE EDIT SEARCH	(english) : FILE EDIT SEARCH
<p align="center"><b>SITUATION DU COMMERCE EN VIF ENTRE LE CANADA ET LES ÉTATS-UNIS</b></p> <p>Les importations de bovins d'abattage reculaient de 52% à 337 sujets la semaine dernière. Les exportations de bovins d'abattage doubleraient, atteignant 8500 sujets. Les exportations de porcs sur pied augmentaient de 36% à 4149 sujets.</p> <p align="center"><b>LES MARCHÉS DE L'EST</b></p> <p><b>BOVINS</b> Les bovins d'abattage connaissent une demande sélective à Toronto. Les bouvillons maigres et les génisses se vendent à prix soutenus. Les types plus gras étaient vendus à rabais, alors que les meilleures génisses augmentaient de \$3-\$4.</p> <p><b>BOVINS ET VACHES</b> Des approvisionnements normaux de vaches de boucherie à Montréal s'échangeaient sous l'effet d'une bonne demande. Les prix augmentaient de \$1.00 lundi, demeurant soutenus pour le reste de la semaine. Ils avaient perdu \$2.00 à la clôture du marché cependant.</p> <p><b>VEAUX</b> Les veaux de lait à Montréal s'échangeaient à prix soutenus sous l'effet d'une bonne demande. Les bons veaux se vendaient à prix soutenus, alors que les veaux lourds s'échangeaient à faibles prix à Toronto.</p> <p><b>BOVINS DE REMPLACEMENT</b> Les sujets de remplacement continuaient à s'échanger à prix fermes. Les bouvillons étaient de bonne qualité, alors que les génisses étaient médiocres.</p> <p><b>AGNEAUX ET MOUTONS</b> Des faibles arrivages d'agneaux à Toronto se vendaient à prix soutenus. Un approvisionnement lourd d'autres classes connaissait une demande modérée.</p> <p><b>PORCS</b> Les prix de porc d'indice 100 à Ontario étaient en hausse de \$2.00 la semaine dernière.</p>	<p align="center"><b>CANADIAN LIVE TRADE SITUATION WITH THE UNITED STATES</b></p> <p>Imports of slaughter cattle declined 52% last week to 337 head. Exports of slaughter cattle doubled, totalling 8500 head. Live hog exports increased 36% to 4149 head.</p> <p align="center"><b>EASTERN MARKETS</b></p> <p><b>SLAUGHTER MARKET</b> In Toronto, slaughter cattle met a selective demand. Lean steers and heifers sold at steady prices. Fatter types were discounted, while the top heifers were up \$3-\$4.</p> <p><b>SLAUGHTER COW MARKET</b> Normal supplies of butcher cows in Montreal traded under a good demand. Monday, prices advanced \$1.00, remaining steady for the rest of the week. Cows in Toronto opened \$1.00 higher. However, at the close of the market, they had lost \$2.00.</p> <p><b>VEAL MARKET</b> Veal calves in Montreal traded at steady prices under a good demand. In Toronto, good calves sold at steady prices, while heavy calves traded at low prices.</p> <p><b>REPLACEMENT MARKET</b> Replacements continued to trade at fully steady prices. The steers were of good quality, while the heifers were poor.</p> <p><b>SHEEP AND LAMB MARKET</b> Light receipts of lambs in Toronto sold at steady prices. A heavy supply of other classes met a moderate demand.</p> <p><b>HOG MARKET</b> Index 100 hog prices in Ontario were \$2.00 higher last week.</p>


**CRITTER Demo Interface**

Screen 5 : The final situation, after the CRITTER system has translated all the sentences in the English report.


Translation Workstation	
(french) : FILE EDIT SEARCH	(english) : FILE EDIT SEARCH
<p>SITUATION DU COMMERCE EN VIF ENTRE LE CANADA ET LES ETATS-UNIS</p> <p>Les importations de bovins d'abattage reculaient de 52% à 337 sujets la semaine dernière. Les exportations de bovins d'abattage doubleraient, atteignant 8500 sujets. Les exportations de porcs sur pied augmentaient de 36% à 4149 sujets</p> <p>LES MARCHÉS DE L'EST <span>Translate Dictionary*</span></p> <p><b>BOVINS</b> Les bovins d'abattage connaissent une demande sélective à Toronto. Les bouvillons maigres et les génisses se vendent à prix soutenus. Les types plus gras étaient vendus à rabais, alors que les meilleures génisses augmentaient de \$3-\$4.</p> <p><b>BOVINS ET VACHES</b> Des approvisionnements normaux de vaches de boucherie à Montréal s'échangeaient sous l'effet d'une bonne demande. Les prix augmentaient de \$1.00 lundi, demeurant soutenus pour le reste de la semaine. Ils avaient perdu \$2.00 à la clôture du marché cependant.</p> <p><b>VEAUX</b> Les veaux de lait à Montréal s'échangeaient à prix soutenus sous l'effet d'une bonne demande. Les bons veaux se vendaient à prix soutenus, alors que les veaux lourds s'échangeaient à faibles prix à Toronto.</p> <p><b>BOVINS DE REMPLACEMENT</b> Les sujets de remplacement continuaient à s'échanger à prix fermes. Les bouvillons étaient de bonne qualité, alors que les génisses étaient médiocres.</p> <p><b>AGNEAUX ET MOUTONS</b> Des faibles arrivages d'agneaux à Toronto se vendaient à prix soutenus. Un approvisionnement lourd d'autres classes connaissait une demande modérée.</p> <p><b>PORCS</b> Les prix de porc d'indice 100 à Ontario étaient en hausse de \$2.00 la semaine dernière.</p>	<p>CANADIAN LIVE TRADE SITUATION WITH THE UNITED STATES</p> <p>Imports of slaughter cattle declined 52% last week to 337 head. Exports of slaughter cattle doubled, totalling 8500 head. Live hog exports increased 36% to 4149 head.</p> <p>EASTERN MARKETS</p> <p><b>SLAUGHTER MARKET</b> In Toronto, slaughter cattle met a selective demand. Lean steers and heifers sold at steady prices. Fatter types were discounted, while the top heifers were up \$3-\$4.</p> <p><b>SLAUGHTER COW MARKET</b> Normal supplies of butcher cows in Montreal traded under a good demand. Monday, prices advanced \$1.00, remaining steady for the rest of the week. Cows in Toronto opened \$1.00 higher. However, at the close of the market, they had lost \$2.00.</p> <p><b>VEAL MARKET</b> Veal calves in Montreal traded at steady prices under a good demand. In Toronto, good calves sold at steady prices, while heavy calves traded at low prices.</p> <p><b>REPLACEMENT MARKET</b> Replacements continued to trade at fully steady prices. The steers were of good quality, while the heifers were poor.</p> <p><b>SHEEP AND LAMB MARKET</b> Light receipts of lambs in Toronto sold at steady prices. A heavy supply of other classes met a moderate demand.</p> <p><b>HOG MARKET</b> Index 100 hog prices in Ontario were \$2.00 higher last week.</p>


**CRITTER Demo Interface**

Screen 6 : Demonstration of the reversibility of the system: a sentence that was earlier translated from English to French is re-translated back from French to English.



Translation Workstation	
(french) : FILE EDIT SEARCH	(english) : FILE EDIT SEARCH
<p align="center"><b>SITUATION DU COMMERCE EN VIF ENTRE LE CANADA ET LES ÉTATS-UNIS</b></p> <p>Les importations de bovins d'abattage reculaient de 52% à 337 sujets la semaine dernière. Les exportations de bovins d'abattage doubleraient, atteignant 8500 sujets. Les exportations de porcs sur pied augmentaient de 36% à 4149 sujets</p> <p align="center"><b>LES MARCHÉS DE L'EST</b></p> <p><b>BOVINS</b> Les bovins d'abattage connaissaient une demande sélective à Toronto. Les bouvillons maigres et les génisses se vendaient à prix soutenus. Les types plus gras étaient vendus à rabais, alors que les meilleures génisses augmentaient de \$3-\$4.</p> <p><b>BOVINS ET VACHES</b> Des approvisionnements normaux de vaches de boucherie à Montréal s'échangeaient sous l'effet d'une bonne demande. Les prix augmentaient de \$1.00 lundi, demeurant soutenus pour le reste de la semaine. Ils avaient perdu \$2.00 à la clôture du marché cependant.</p> <p><b>VEAUX</b> Les veaux de lait à Montréal s'échangeaient à prix soutenus sous l'effet d'une bonne demande. Les bons veaux se vendaient à prix soutenus, alors que les veaux lourds s'échangeaient à faibles prix à Toronto.</p> <p><b>BOVINS DE REMPLACEMENT</b> Les sujets de remplacement continuaient à s'échanger à prix fermes. Les bouvillons étaient de bonne qualité, alors que les génisses étaient médiocres.</p> <p><b>AGNEAUX ET MOUTONS</b> Des faibles arrivages d'agneaux à Toronto se vendaient à prix soutenus. Un approvisionnement lourd d'autres classes connaissait une demande modérée.</p> <p><b>PORCS</b> Les prix de porc d'indice 100 à Ontario étaient en hausse de \$2.00 la semaine dernière.</p>	<p align="center"><b>CANADIAN LIVE TRADE SITUATION WITH THE UNITED STATES</b></p> <p>Imports of slaughter cattle declined 52% last week to 337 head. Exports of slaughter cattle doubled, totalling 8500 head. Live hog exports increased 36% to 4149 head. <u>Live hog exports advanced 36% at 4149 head.</u></p> <p align="center"><b>EASTERN MARKETS</b></p> <p><b>SLAUGHTER MARKET</b> In Toronto, slaughter cattle met a selective demand. Lean steers and heifers sold at steady prices. Fatter types were discounted, while the top heifers were up \$3-\$4.</p> <p><b>SLAUGHTER COW MARKET</b> Normal supplies of butcher cows in Montreal traded under a good demand. Monday, prices advanced \$1.00, remaining steady for the rest of the week. Cows in Toronto opened \$1.00 higher. However, at the close of the market, they had lost \$2.00.</p> <p><b>VEAL MARKET</b> Veal calves in Montreal traded at steady prices under a good demand. In Toronto, good calves sold at steady prices, while heavy calves traded at low prices.</p> <p><b>REPLACEMENT MARKET</b> Replacements continued to trade at fully steady prices. The steers were of good quality, while the heifers were poor.</p> <p><b>SHEEP AND LAMB MARKET</b> Light receipts of lambs in Toronto sold at steady prices. A heavy supply of other classes met a moderate demand.</p> <p><b>HOG MARKET</b> Index 100 hog prices in Ontario were \$2.00 higher last week.</p>



**CRITTER Demo Interface**


Screen 7 : The result of this re-translation is a paraphrase of the original English sentence. This is one of the specific feature attributable, in our case, to a purely semantic transfer.

Translation Workstation	
(french) : FILE EDIT SEARCH	(english) : FILE EDIT SEARCH
<p style="text-align: center;"><b>SITUATION DU COMMERCE EN VIF ENTRE LE CANADA ET LES ÉTATS-UNIS</b></p> <p>Les importations de bovins d'abattage reculaient de 52% à 337 sujets la semaine dernière.            Les exportations de bovins d'abattage doubleraient, atteignant 8500 sujets.            Les exportations de porcs sur pied augmentaient de 36% à 4149 sujets.</p> <p style="text-align: center;"><b>LES MARCHÉS DE L'EST</b></p> <p><b>BOVINS</b>            Les bovins d'abattage connaissent une demande sélective à Toronto. Les bouvillons maigres et les génisses se vendent à prix soutenus. Les types plus gras étaient vendus à rabais, alors que les meilleures génisses augmentaient de \$3-\$4.</p> <p><b>BOVINS ET VACHES</b>            Des approvisionnements normaux de vaches de boucherie à Montréal s'échangeaient sous l'effet d'une bonne demande.            Les prix augmentaient de \$1.00 lundi, demeurant soutenus pour le reste de la semaine.            Ils avaient perdu \$2.00 à la clôture du marché cependant.</p> <p><b>VEAUX</b>            Les veaux de lait à Montréal s'échangeaient à prix soutenus sous l'effet d'une bonne demande.            Les bons veaux se vendaient à prix soutenus, alors que les veaux lourds s'échangeaient à faibles prix à Toronto.</p> <p><b>BOVINS DE REMPLACEMENT</b>            Les sujets de remplacement continuent à être vendus à prix soutenus. Les bouvillons étaient de bonne qualité, mais les médiocres.</p> <p><b>AGNEAUX ET MOUTONS</b>            Des faibles arrivages d'agneaux à Toronto. Un approvisionnement lourd d'autre part à Montréal.</p> <p><b>PORCS</b>            Les prix de porc d'indice 100 à 0.90 la semaine dernière.</p>	<p style="text-align: center;"><b>CANADIAN LIVE TRADE SITUATION WITH THE UNITED STATES</b></p> <p>Imports of slaughter cattle declined 52% last week to 337 head. Exports of slaughter cattle doubled, totalling 8500 head. Live hog exports increased 36% to 4149 head.</p> <p style="text-align: center;"><b>EASTERN MARKETS</b></p> <p><b>SLAUGHTER MARKET</b>            In Toronto, slaughter cattle met a selective demand. Lean steers and heifers sold at steady prices. Fatter types were discounted, while the top heifers were up \$3-\$4.</p> <p><b>SLAUGHTER COW MARKET</b>            Normal supplies of butcher cows in Montreal traded under a good demand. Monday, prices advanced \$1.00, remaining steady for the rest of the week. Cows in Toronto opened \$1.00 higher. However, at the close of the market, they had lost \$2.00.</p> <p><b>VEAL MARKET</b>            Veal calves in Montreal traded at steady prices under a good demand. In Toronto, good calves sold at steady prices, while heavy calves traded at low prices.</p> <p><b>REPLACEMENT MARKET</b>            Replacement calves were sold at steady prices. While the heifers were poor. To sold at steady prices. met a moderate demand. were \$2.00 higher last week.</p>
<div style="border: 1px solid black; padding: 5px; margin: 0 auto; width: 80%;"> <p><b>Options control panel</b></p> <p>Language : <input checked="" type="radio"/> English</p> <p>Processing mode : <input type="radio"/> no intermediate structures <input checked="" type="radio"/> <b>display intermediate structures</b></p> <p>Content of nodes : <input type="radio"/> not retained</p> <p>Hardcopy printer : <input checked="" type="radio"/> MAT group</p> <p style="text-align: center;"> <input type="button" value="SAVE"/> <input type="button" value="CANCEL"/> <input type="button" value="DEFAULT"/> <input type="button" value="QUIT"/> </p> </div>	
<div style="border: 1px solid black; padding: 5px; margin: 0 auto; width: 80%;"> <div style="display: flex; align-items: center; justify-content: space-between;"> <p><b>CRITTER Demo Interface</b></p> </div> <p style="text-align: center;"> <input type="button" value="PRINT"/> <input type="button" value="OPTIONS..."/> <input type="button" value="QUIT"/> </p> </div>	

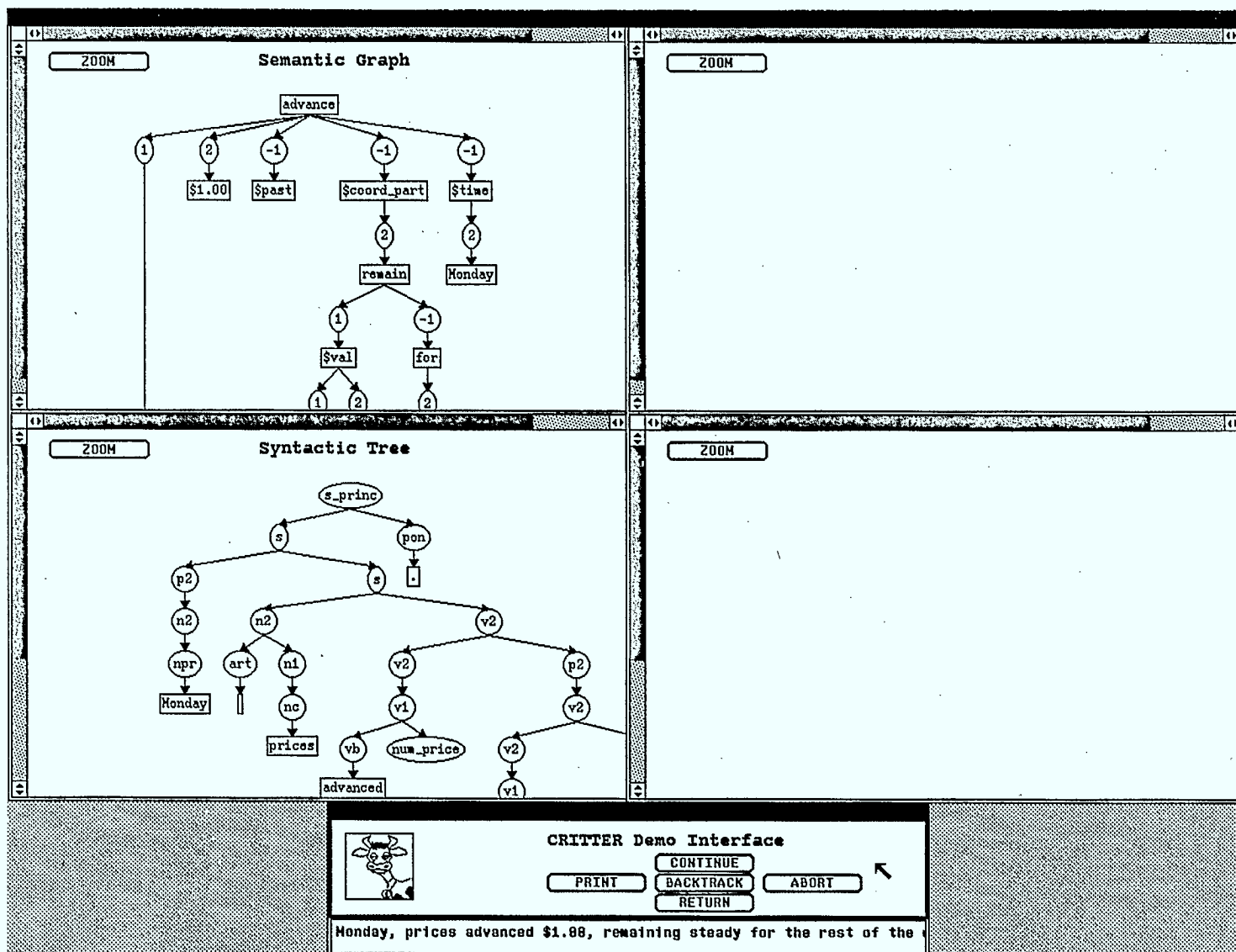
Screen 8 : Change in the execution parameter : the user requests that the linguistic structures passed between the three translation stages be displayed.



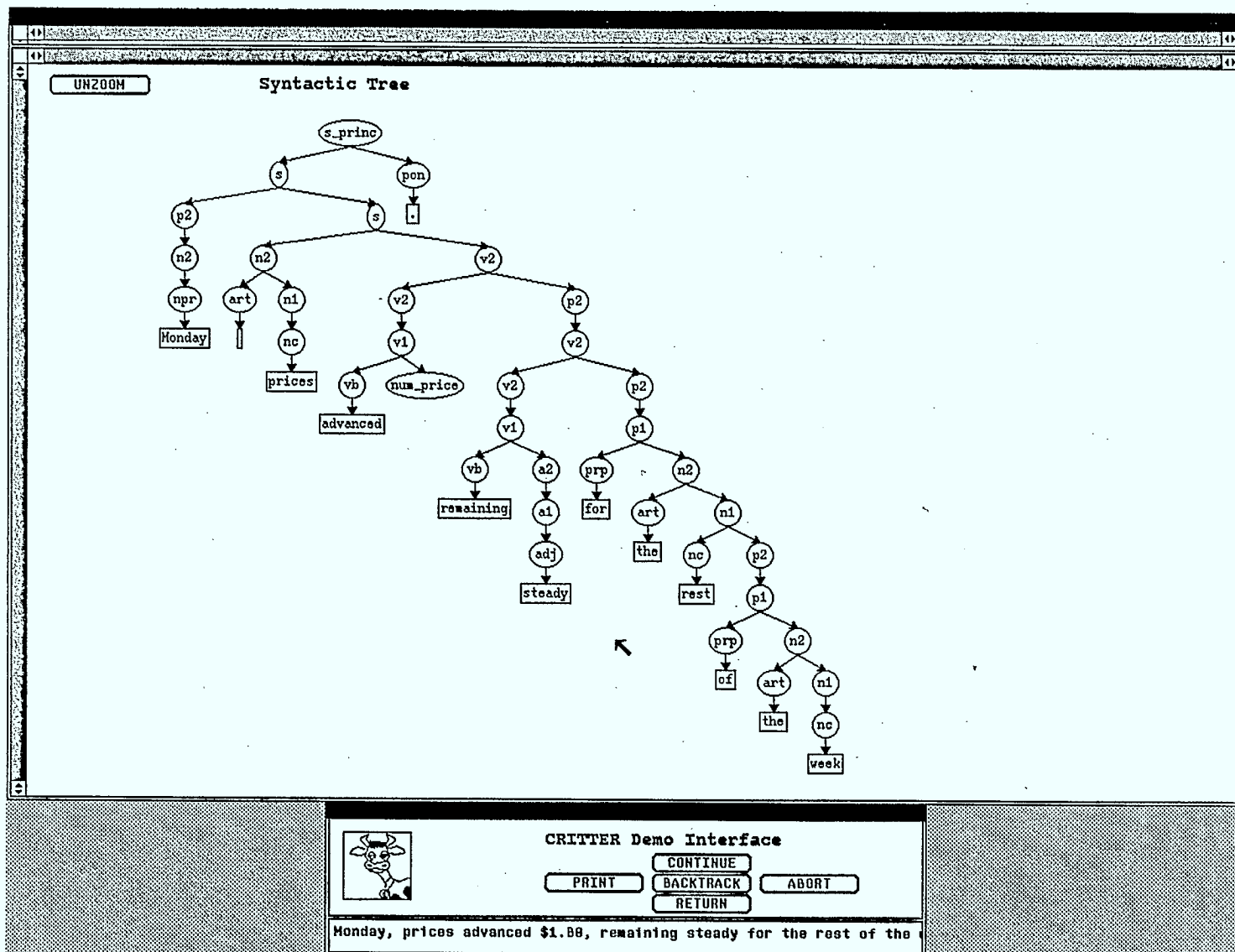
Translation Workstation	
(french) : FILE EDIT SEARCH	(english) : FILE EDIT SEARCH
<p align="center"><b>SITUATION DU COMMERCE EN VIF ENTRE LE CANADA ET LES ETATS-UNIS</b></p> <p>Les importations de bovins d'abattage reculaient de 52% à 337 sujets la semaine dernière. Les exportations de bovins d'abattage doubleraient, atteignant 8500 sujets. Les exportations de porcs sur pied augmentaient de 36% à 4149 sujets.</p> <p align="center"><b>LES MARCHÉS DE L'EST</b></p> <p><b>BOVINS</b> Les bovins d'abattage connaissent une demande sélective à Toronto. Les bouvillons maigres et les génisses se vendent à prix soutenus. Les types plus gras étaient vendus à rabais, alors que les meilleures génisses augmentaient de \$3-\$4.</p> <p><b>BOVINS ET VACHES</b> Des approvisionnements normaux de vaches de boucherie à Montréal s'échangeaient sous l'effet d'une bonne demande. Les prix augmentaient de \$1.00 lundi, demeurant soutenus pour le reste de la semaine. Ils avaient perdu \$2.00 à la clôture du marché cependant.</p> <p><b>VEAUX</b> Les veaux de lait à Montréal s'échangeaient à prix soutenus sous l'effet d'une bonne demande. Les bons veaux se vendaient à prix soutenus, alors que les veaux lourds s'échangeaient à faibles prix à Toronto.</p> <p><b>BOVINS DE REMPLACEMENT</b> Les sujets de remplacement continuaient à s'échanger à prix fermes. Les bouvillons étaient de bonne qualité, alors que les génisses étaient médiocres.</p> <p><b>AGNEAUX ET MOUTONS</b> Des faibles arrivages d'agneaux à Toronto se vendaient à prix soutenus. Un approvisionnement lourd d'autres classes connaissait une demande modérée.</p> <p><b>PORCS</b> Les prix de porc d'indice 100 à Ontario étaient en hausse de \$2.00 la semaine dernière.</p>	<p align="center"><b>CANADIAN LIVE TRADE SITUATION WITH THE UNITED STATES</b></p> <p>Imports of slaughter cattle declined 52% last week to 337 head. Exports of slaughter cattle doubled, totalling 8500 head. Live hog exports increased 36% to 4149 head.</p> <p align="center"><b>EASTERN MARKETS</b></p> <p><b>SLAUGHTER MARKET</b> In Toronto, slaughter cattle met a selective demand. Lean steers and heifers sold at steady prices. Fatter types were discounted, while the top heifers were up \$3-\$4.</p> <p><b>SLAUGHTER COW MARKET</b> Normal supplies of butcher cows in Montreal traded under a good demand. Monday, prices advanced \$1.00, remaining steady for the rest of the week. Cows in Toronto <b>Translate</b> higher. However, at the <b>Dictionary</b> market, they had lost \$2.00.</p> <p><b>VEAL MARKET</b> Veal calves in Montreal traded at steady prices under a good demand. In Toronto, good calves sold at steady prices, while heavy calves traded at low prices.</p> <p><b>REPLACEMENT MARKET</b> Replacements continued to trade at fully steady prices. The steers were of good quality, while the heifers were poor.</p> <p><b>SHEEP AND LAMB MARKET</b> Light receipts of lambs in Toronto sold at steady prices. A heavy supply of other classes met a moderate demand.</p> <p><b>HOG MARKET</b> Index 100 hog prices in Ontario were \$2.00 higher last week.</p>


**CRITTER Demo Interface**

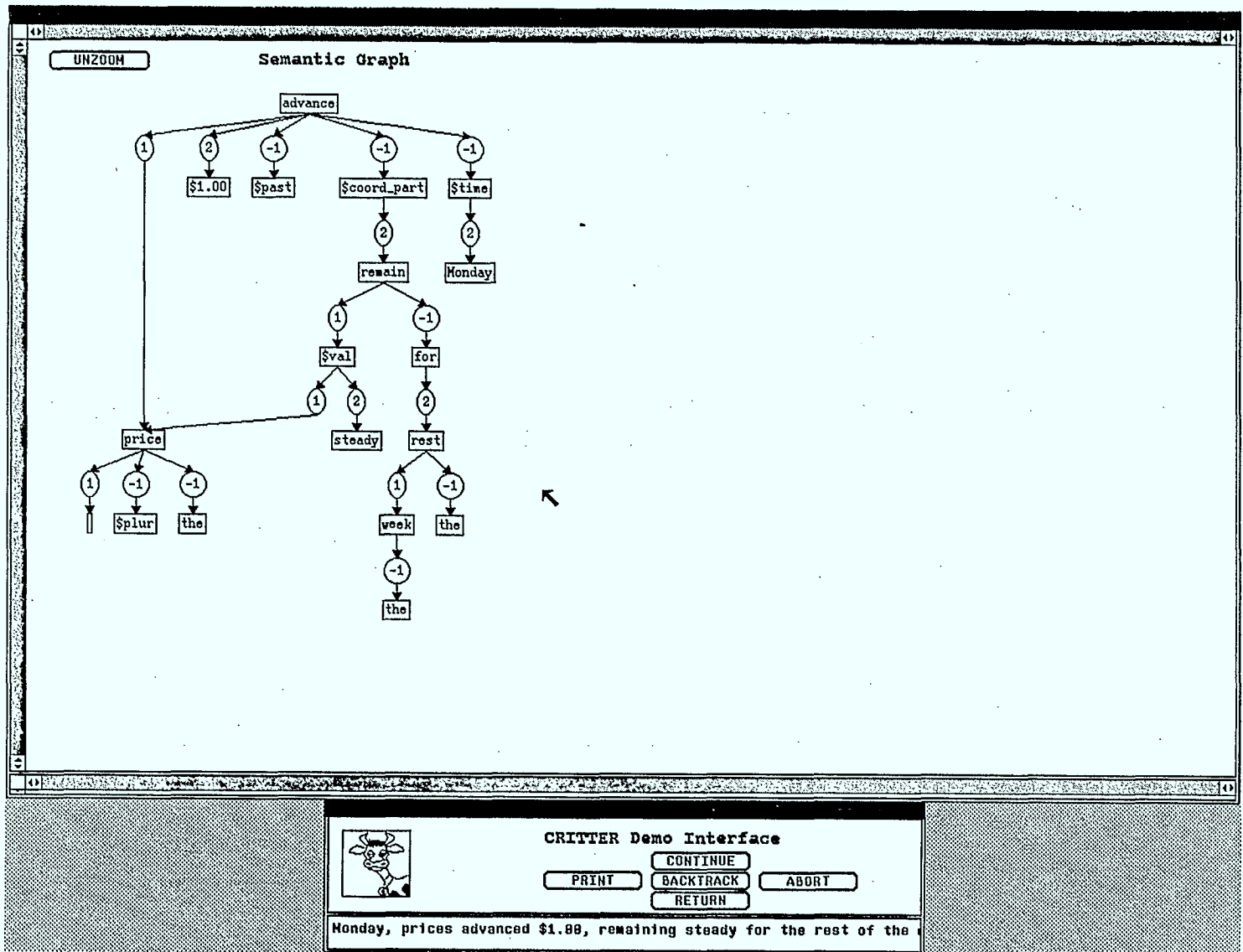
Screen 9 : New selection of a sentence to be translated, and issuing the translate command.



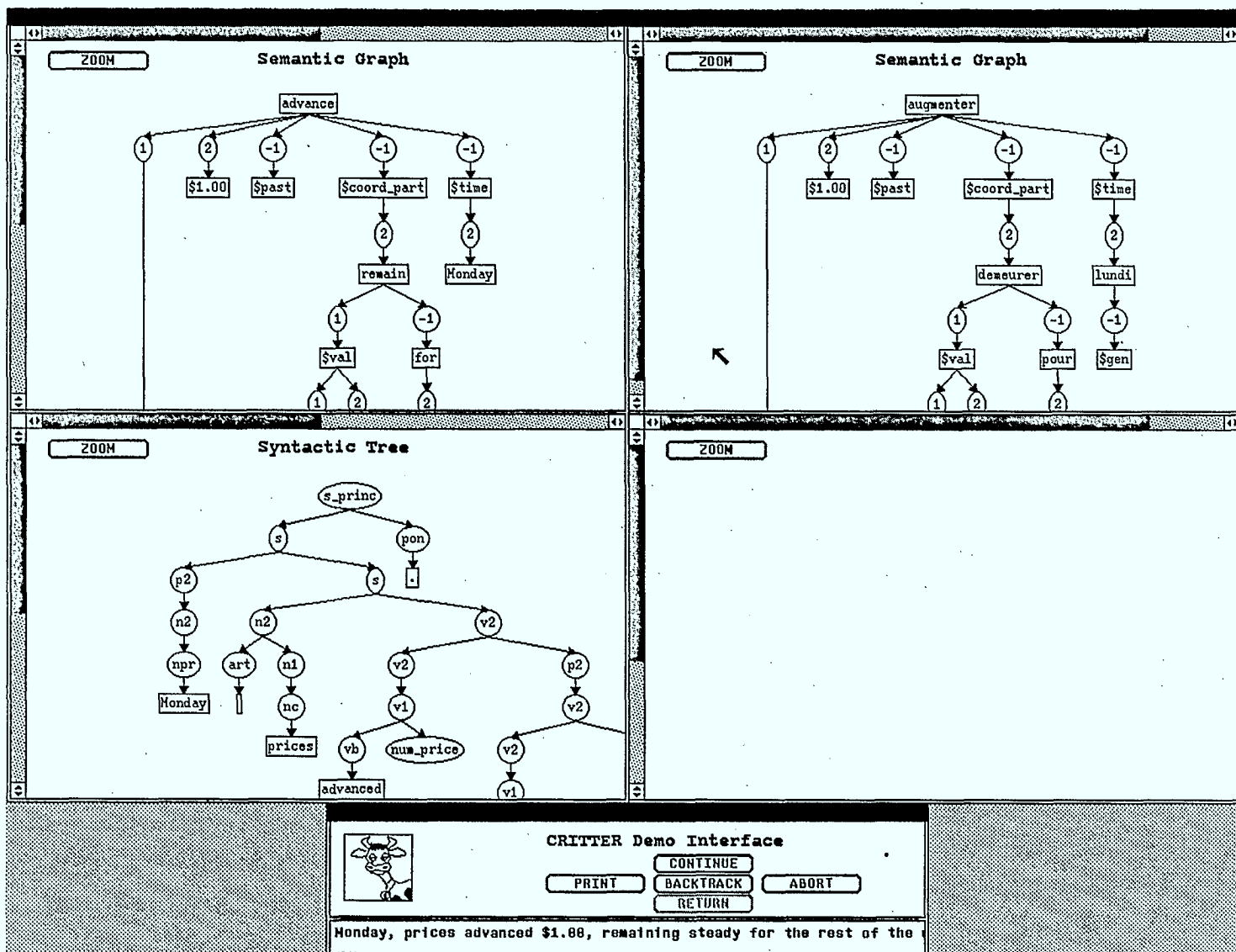
Screen 10 : Results of the analysis : CRITTER displays a syntactic tree and the semantic graph for the initial sentence, which appears at the bottom of the screen.



Screen 11 : Enlargement of the window containing the syntactic tree. This is an auxiliary structure built during the analysis, but which has no effect on the following transfer step.

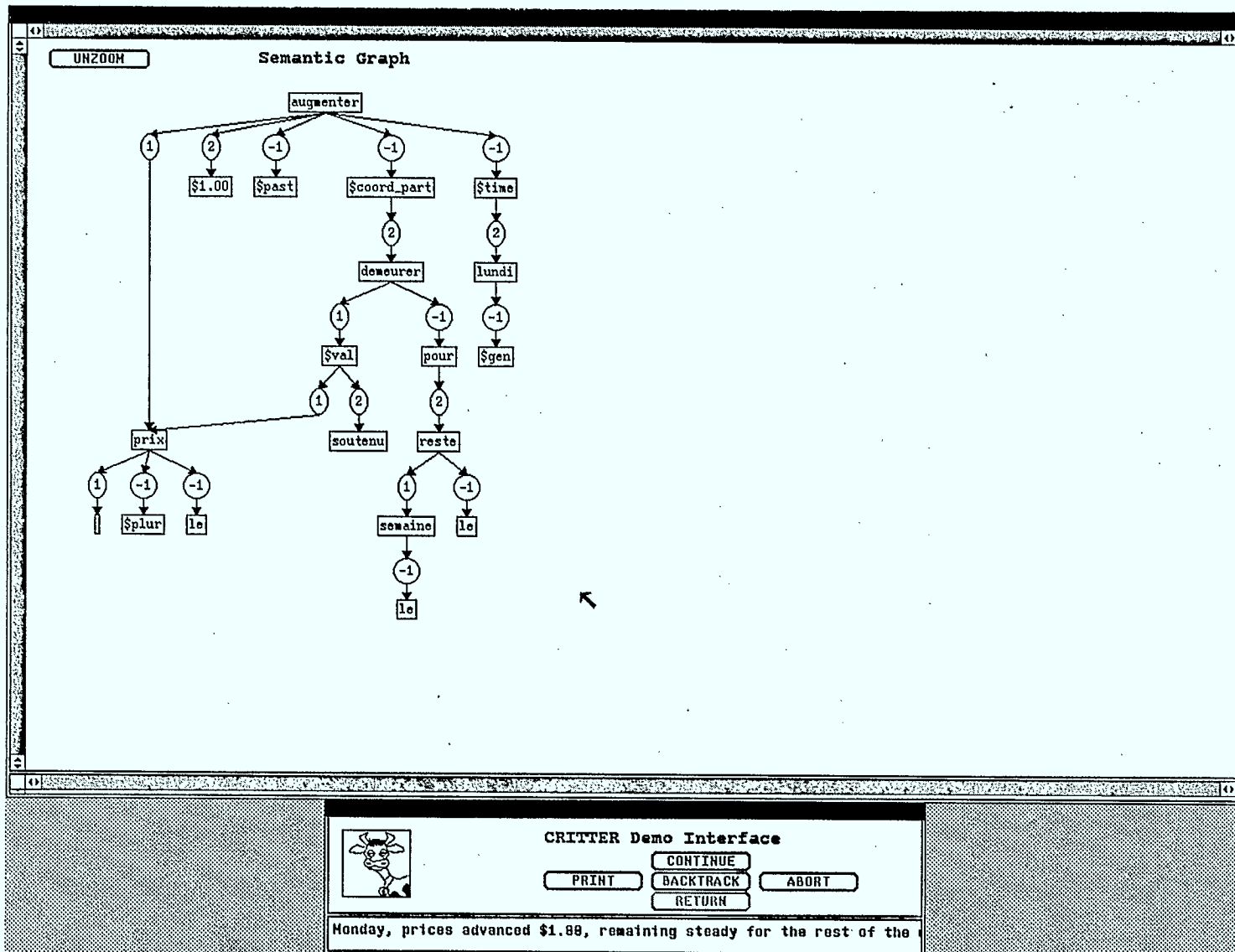


Screen 12 : Enlargement of the window containing the semantic graph (consult [CRITTER] for more details on semantic structures).



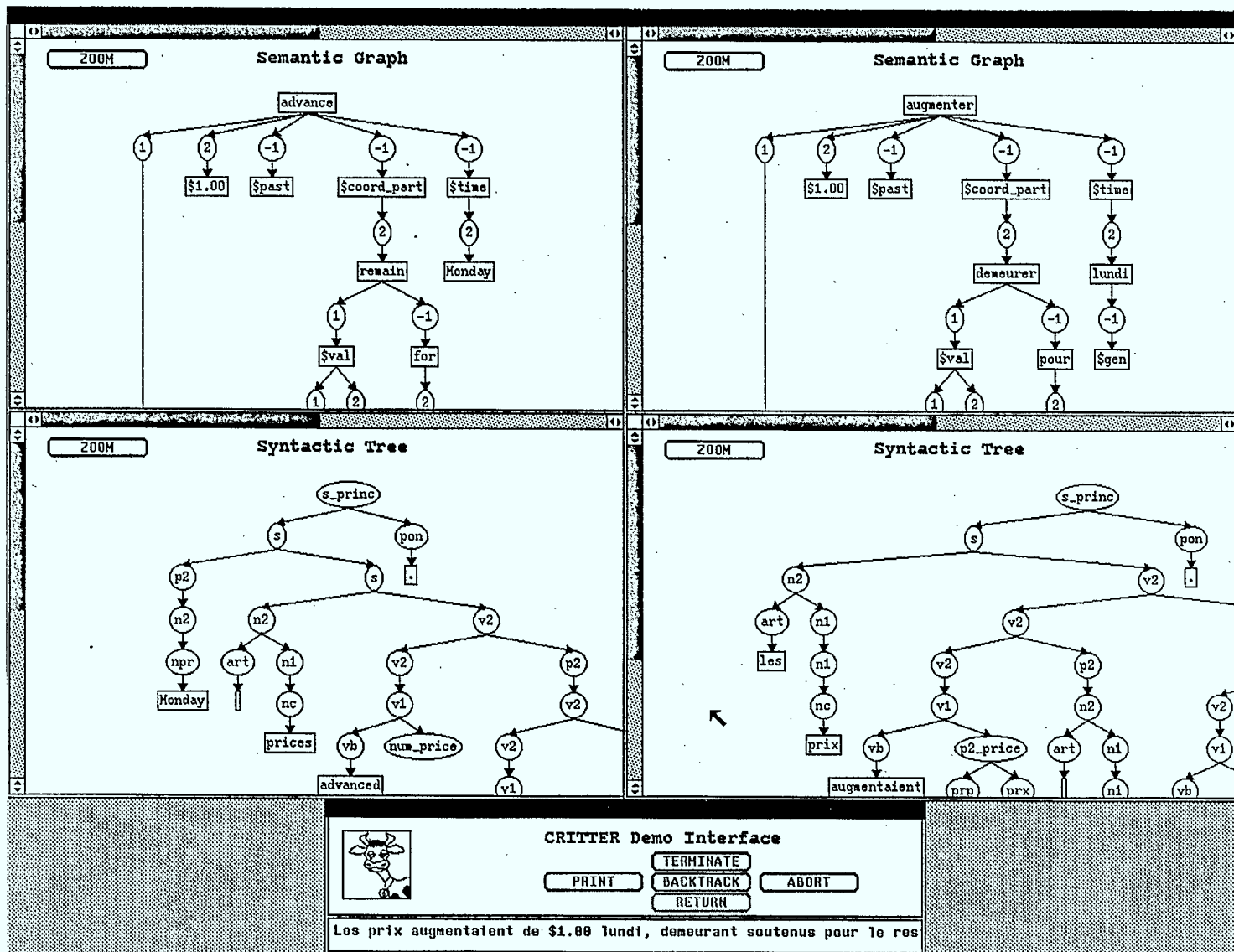
Screen 13 : Results of the transfer : the CRITTER system displays the semantic graph of the translated sentence (in the target language), which still has to be synthesized.



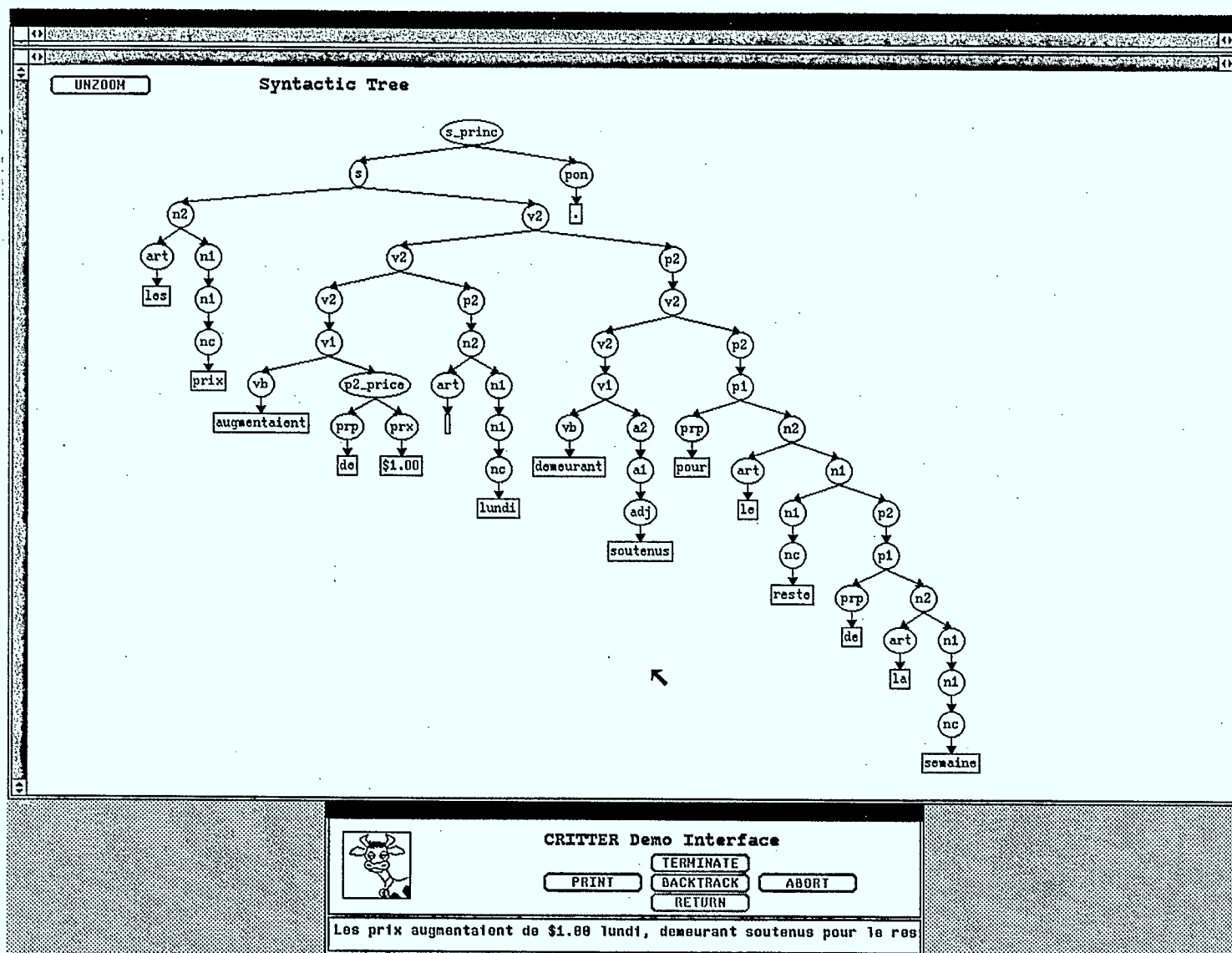


Screen 14: Enlargement of the window containing the semantic graph.






Screen 15 : Results of the synthesis : the CRITTER system display the syntactic tree and the synthesized sentence. Note that the translated sentence is displayed at the bottom of the control panel.



Screen 16: Enlargement of the window containing the syntactic tree.

Translation Workstation	
(french) : FILE EDIT SEARCH	(english) : FILE EDIT SEARCH
<p align="center"><b>SITUATION DU COMMERCE EN VIF ENTRE LE CANADA ET LES ÉTATS-UNIS</b></p> <p>Les importations de bovins d'abattage reculaient de 52% à 337 sujets la semaine dernière. Les exportations de bovins d'abattage doubleraient, atteignant 8500 sujets. Les exportations de porcs sur pied augmentaient de 36% à 4149 sujets.</p> <p align="center"><b>LES MARCHÉS DE L'EST</b></p> <p><b>BOVINS</b> Les bovins d'abattage connaissaient une demande sélective à Toronto. Les bouvillons maigres et les génisses se vendaient à prix soutenus. Les types plus gras étaient vendus à rabais, alors que les meilleures génisses augmentaient de \$3-\$4.</p> <p><b>BOVINS ET VACHES</b> Des approvisionnements normaux de vaches de boucherie à Montréal s'échangeaient sous l'effet d'une bonne demande. <b>Les prix augmentaient de \$1.00 lundi, demeurant soutenus pour le reste de la semaine.</b> Ils avaient perdu \$2.00 à la clôture du marché cependant.</p> <p><b>VEAUX</b> Les veaux de lait à Montréal s'échangeaient à prix soutenus sous l'effet d'une bonne demande. Les bons veaux se vendaient à prix soutenus, alors que les veaux lourds s'échangeaient à faibles prix à Toronto.</p> <p><b>BOVINS DE REMPLACEMENT</b> Les sujets de remplacement continuaient à s'échanger à prix fermes. Les bouvillons étaient de bonne qualité, alors que les génisses étaient médiocres.</p> <p><b>AGNEAUX ET MOUTONS</b> Des faibles arrivages d'agneaux à Toronto se vendaient à prix soutenus. Un approvisionnement lourd d'autres classes connaissait une demande modérée.</p> <p><b>PORCS</b> Les prix de porc d'indice 100 à Ontario étaient en hausse de \$2.00 la semaine dernière.</p>	<p align="center"><b>CANADIAN LIVE TRADE SITUATION WITH THE UNITED STATES</b></p> <p>Imports of slaughter cattle declined 52% last week to 337 head. Exports of slaughter cattle doubled, totalling 8500 head. Live hog exports increased 36% to 4149 head.</p> <p align="center"><b>EASTERN MARKETS</b></p> <p><b>SLAUGHTER MARKET</b> In Toronto, slaughter cattle met a selective demand. Lean steers and heifers sold at steady prices. Fatter types were discounted, while the top heifers were up \$3-\$4.</p> <p><b>SLAUGHTER COW MARKET</b> Normal supplies of butcher cows in Montreal traded under a good demand. Monday, prices advanced \$1.00, remaining steady for the rest of the week. Cows in Toronto opened \$1.00 higher. However, at the close of the market, they had lost \$2.00.</p> <p><b>VEAL MARKET</b> Veal calves in Montreal traded at steady prices under a good demand. In Toronto, good calves sold at steady prices, while heavy calves traded at low prices.</p> <p><b>REPLACEMENT MARKET</b> Replacements continued to trade at fully steady prices. The steers were of good quality, while the heifers were poor.</p> <p><b>SHEEP AND LAMB MARKET</b> Light receipts of lambs in Toronto sold at steady prices. A heavy supply of other classes met a moderate demand.</p> <p><b>HOG MARKET</b> Index 100 hog prices in Ontario were \$2.00 higher last week.</p>



**CRITTER Demo Interface**

PRINT
OPTIONS...
QUIT

Screen 17 : The translated sentence is highlighted.

## Acknowledgements

---

I wish to thank Pierre Isabelle, head of the CRITTER project at the CWARC, for his confidence in my work, his availability and his enthusiasm.

I also wish to extend my particular thanks to Bruno Godbout for his initial work on the use of ProWINDOWS, and for creating the analysis demonstration interface and the first version of the CRITTER system demonstration interface.

Finally, I would like to thank all my colleagues in the MAT group -- Marc Dymetman, Elliott Macklovitch, François Perreault, and Michel Simard -- for their cooperation and helpful advice in creating the interface and preparing this report.

## Bibliography

---

[CRITTER]

*CRITTER : A Translation System for Agricultural Market Reports*, P. Isabelle, M. Dymetman, E. Macklovitch, CWARC, Department of Communications (1988).

[Reversibility]

*Reversible Logic Grammars for Machine Translation*, P. Isabelle, M. Dymetman, CWARC, Department of Communications, (1988).

[TW]

*The Translator's Workstation Project*, E. Macklovitch, P. Isabelle, CWARC, Department of Communications, (1988).



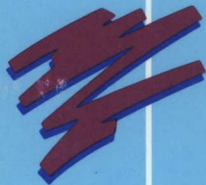
97992

COCHARD, JEAN-LUC  
--CRITTER system demonstration inter-  
face

P  
308  
C63e  
1989  
c.2

DATE DUE

A blank sheet of white graph paper with a black grid pattern. The grid consists of 10 columns and 15 rows. The paper is slightly tilted and has a yellow border around it.



**Pour plus de détails,  
veuillez communiquer avec :**

*Le Centre canadien de recherche  
sur l'informatisation du travail*  
1575, boulevard Chomedey  
Laval (Québec)  
H7V 2X2  
(514) 682-3400

**For more information,  
please contact:**

*Canadian Workplace  
Automation Research Centre*  
1575 Chomedey Blvd.  
Laval, Quebec  
H7V 2X2  
(514) 682-3400

