

Tutorial 7 M150

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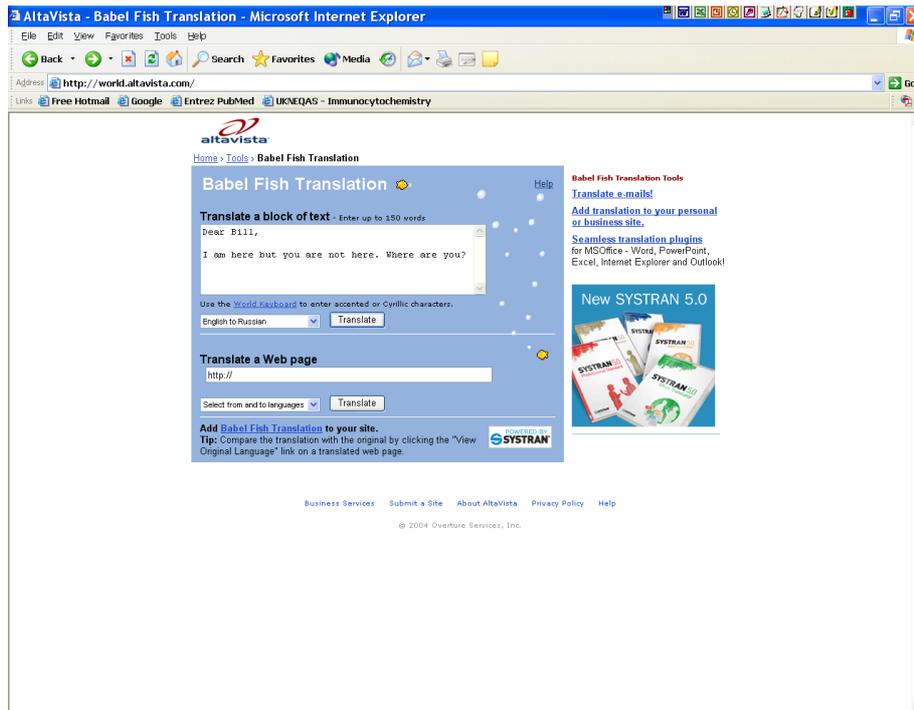
I have put this tutorial on the web. This tutorial can be viewed and downloaded from <http://www.users.totalise.co.uk/~rifat> then selecting M150 Tutorials then Tutorial 7.

- 1) Spend a few minutes thinking whether the following are wild.
 - (a) The orbit of the moon around the earth
 - (b) The outbreak of a new virus.
 - (c) The choice of a new computer.

Try to explain your answers in terms of the three characteristics of wildness.
- 2) What are the three characteristics of wildness and how are they associated with wild phenomena? Give examples.
- 3) What are the four dimensions of reach and how should they be grouped together?
- 4) Give examples to show how each of the senses of sight, hearing and touch can be extended by using computers.
- 5) Define currency in the context of human-computer interaction, and list the two basic types of computing currency.
- 6) Identify which one of the four activities associated with the information loop of computing is involved in each of the following activities :
 - (a) Receiving and then reading the contents of an email message.
 - (b) Converting a file from rich text format (.rtf) to ASCII.
 - (c) Explaining to someone how to install a piece of software on their PC.
 - (d) Saving a letter written using a word processor as a file in text only (.txt) format.
- 7) Consider the <http://www.users.totalise.co.uk/~rifat> website. Look at the feature of the website's user interface. Consider the following design principles: feedback, simplicity, structure, tolerance.

Evaluate how these design principles relate to the feature you have chosen by writing a paragraph on each, stating whether or not the feature associated with the facilities of the website satisfies the principle; explain your reasoning in each case.

- 8) Define what is meant by software crisis and explain why most software always have bugs in them and usually crash once in a while? What steps can be implemented to solve this.
- 9) Carry out the following exercise related to using computers in natural language processing.
- a) Go to Babel Fish website (use Google or type the web address below)

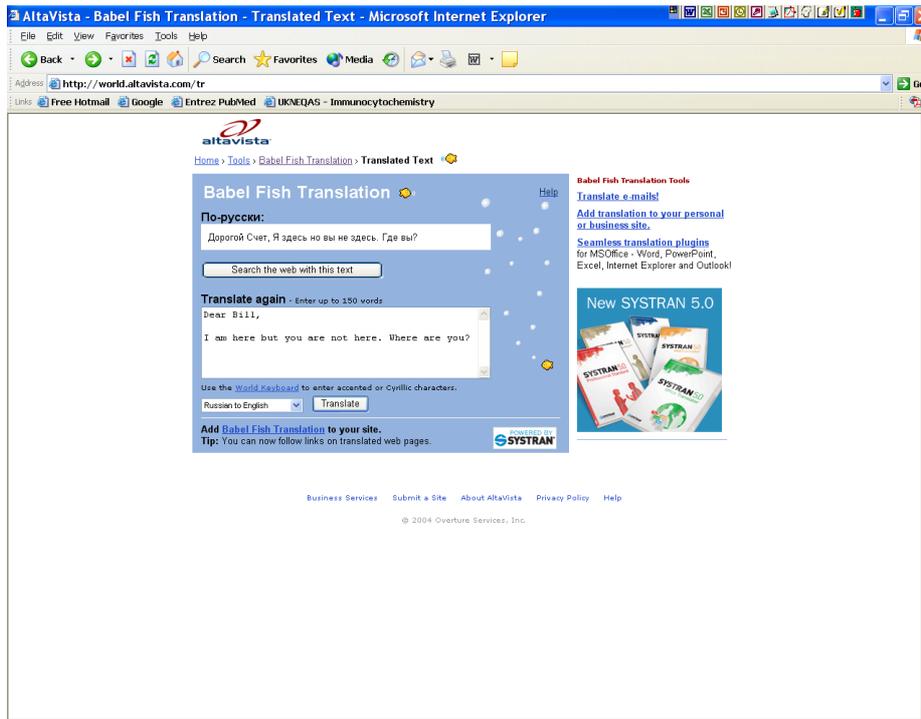


Enter the English sentence :

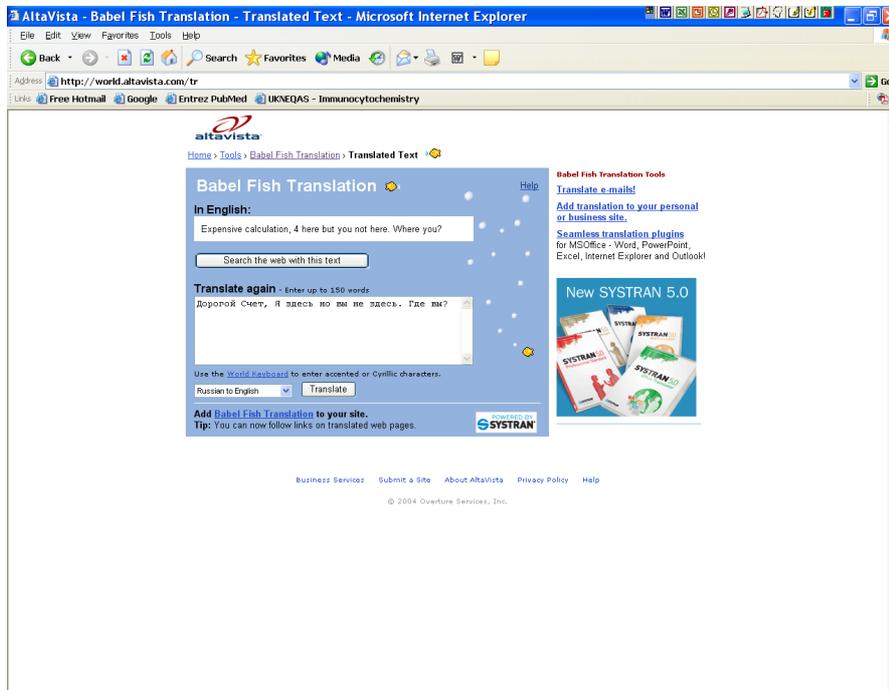
Dear Bill,

I am here but you are not here. Where are you?

(b) Click to translate. English to Russian translation



(c) Copy the Russian translated sentence and translate using Russian to English translation.



On completing this exercise you will find that the original sentence is :

Dear Bill,

I am here but you are not here. Where are you?

But the final sentence after double translation (i.e. English to Russian, Russian to English) :

Expensive calculation, 4 here but you not here. Where you?

Why is that? Discuss the problems with using computers in natural language processing and how such a problem can contribute to software failure and the software crisis in general?

Answer to question 1

(a) The orbit of the moon around the earth is highly predictable and highly rational (since it can be explained using known scientific laws), but highly uncontrollable (at least by us).

(b) The outbreak of a new virus results from a highly complex variety of causes and so is very unpredictable. We know, however, how new viruses arise, and so can explain an outbreak; it is therefore rational. We would hope that an outbreak would be controllable but, even at the best of times, control may be difficult.

(c) The choice of a new computer should be something that is highly predictable, highly rational and highly controllable assuming, of course, that you know what you want to buy!

Answer to question 2

The three characteristics of wildness are uncontrollability, unpredictability and irrationality. Some, but not necessarily all, of these characteristics have to be present for something to be considered 'wild'.

Spend a few minutes thinking about your own experiences of the wildness of computing. Try to identify two examples of a 'wild' computing phenomenon.

For example, the blizzard of information made up of emails from work colleagues and friends, the convoluted trails created by following links between pages on the web, and perhaps also the unpredictability associated with playing games online with others.

Answer to question 3

The four dimensions of reach are space, time, perception and action. Space and time should be grouped together since taken together they define a context (when and where) in which things happen. Perception and action should be grouped together because they define what happens, and how.

Answer to question 4

Sight : You might have mentioned how, by changing the size, shape and colour of text and images in electronic documents, they can be made more easily viewable by people with visually impairments. Alternatively, you might have talked about the use of computers to produce graphics to show trends and patterns in highly complex sets of data, e.g. changes in stock market share prices over a specified period.

Hearing : You might have referred to the use of computer-controlled cochlear implants by people who are deaf or hard of hearing. Alternatively, you might have mentioned how computer-based audio tools in sound recording studios can be used to edit vocal and musical samples to a precision that was previously unattainable if attempted using conventional technology and a 'trained ear' alone.

Touch : You might have mentioned the force feedback that is found in the hand-held controllers for games consoles such as Sony 's PlayStation 2.

Other examples include virtual reality (VR) systems, such as the University of North Carolina 's Grope-III system, which allows you to 'feel ' the forces involved in defining the appropriate docking site between two molecules; aircraft fly-by-wire systems and the Intellimouse.

Answer to question 5

Currency is that within which, or on the basis of which, human-computer interaction can occur. The two basic types of computing currency are data and information.

There are four possibilities for interaction involving human and computer agents (Subsection 4.2): human-human, human-computer, computer-human, and computer-computer.

Information is the computing currency of humans and data is the computing currency of computers.

On this basis, we would argue that :

Human-human interactions involve information only;

Human-computer and computer-human interactions involve both data and information;

computer-computer interactions involve data only.

Answer to question 6

- (a) Expansion of data into information.
- (b) Transformation of data into data.
- (c) Transformation of information into information.
- (d) Contraction of information into data.

Answer to question 7

In what follows, I have given examples of web design features and behaviour of my web site that satisfy the design principles discussed in Unit 12. My site is designed primarily for OU students. It gives little bit of information about myself and the courses I tutor.

Feedback:

The site lacks feedback as it is suppose to be more informative to the user rather than interactive.

Structure:

The UI (User Interface) design of the Web pages has a structure that matches with the student's expectations. For example, all the important information that a student would like to do are listed at the top of the course page. Also the navigator at the left hand side allows the student to choose the course they want the information about.

Simplicity:

The UI design is simple in terms of the terminology and the structure of the Web pages. Also it lacks graphics and animation which can be a good thing for those students who have slow modem.

Tolerance:

There are no facility to setup an account to log in to the site. Therefore the site doesn't remember who visited it.

Answer to question 8

The software crisis was first identified in the late 1960s, with the growing awareness that software systems were being delivered late, over budget, and not satisfying user needs. The difficulty of expressing system requirements clearly and completely was identified as a major source of these failures.

The main source of failure in software systems are :

- Inadequate requirements
- Incorrect coding
- Infeasibility of testing
- Inadequate models
- Over-maintained code

Steps to solve this is to use software engineering principles and follow the software life cycle as follows :

Feasibility study
System requirements and specification
System design
Implementation (coding) and system testing
Software Maintenance.

In order to avoid mistakes due to natural language communications use formal specification languages such as Z and VDM to capture the user's requirements and specification and following this by creating a prototype for the user to play with.

Answer to question 9

At this level of application most of the translation is done by just replacing each word by its nearest equivalent in the target language. It may be possible to recognise different parts of speech like nouns and verbs, and to incorporate some rules for things like plurals and for different endings to verbs, depending for example on the person or the tense. Often there will be several different meanings for the same word in the original (source) language and the most frequently used one might be chosen to be translated into the target language. What is generally missing is any overall understanding of the context in which the words are being used, that might allow a more meaningful choice.

If you return now to the unit you will find that the rest of the current subsection discusses in more detail some of the reasons why the translation task is so difficult to automate. Hopefully what you have seen and thought about in this activity will make the discussion more meaningful. You may even find it worth coming back to the Babelfish application later and typing in a few carefully chosen phrases to see what kind of misunderstandings you can create!

Note that even the beginning of a letter which starts '*Dear Bill ...*' can cause problems and come back through the double translation process as '*Expensive calculation ...*' although most modern translators no longer fall into this trap if you include the upper case '*B*' at the beginning of the name Bill!

Additionally, the problem of context is not just limited to machines! The Russian language does not have the verb 'to be' which is why the translator give "Where you?" for the Russian words "Gdie ti?"

Taken together and adding cultural slangs one can realise the difficulty in using natural language to specify a structured system such as a software that is based on logic and hierarchy. Natural languages are vague and meaning (semantics) can be interpreted differently by different system analysts leading to incorrect specification of the software and hence software failure or over maintenance of software.