Acquiring Reading Skills in a Foreign Language in a Multilingual, Corpus-Based Environment

by

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Abstract

There is currently much demand for effective language courses that target specific audiences, as well as specific needs. The current general trend to subordinate teaching best practices to the capabilities of technology is the subject of numerous critical papers, yet little seems to be done in practical terms to explore the alternatives. It is often reported how labour-intensive the creation of a language course is, and it is frequently noticeable that users have only limited access to tailoring a course to their needs – both in terms of being able to choose from enough criteria in order to create their own path and navigate at their own pace through resources, and in terms of being able to expand the resources available to them.

This paper demonstrates how comparable corpora, richly annotated by automated NLP techniques, can be successfully exploited for foreign language learning within a web-based environment. Specifically, the reading model developed in this project, together with its practical implementation into a computer-assisted language learning (CALL) environment, are designed to help adult speakers (language L1, here English) acquire reading skills in a foreign language (L3, here Romanian) that is cognate with a second language they know to some extent (L2, here French). The environment – named TREAT (Trilingual REAding Tutor) - dynamically processes user requests to display linguistic information extracted from the corpora that is intended to facilitate reading comprehension. TREAT has also been designed to allow the learners as much freedom as possible, while being always at hand to offer support when needed.

A small pilot study was carried out involving Leeds University MA in Applied Translation Studies students, and the results indicate that both my approach and its practical implementation are sound, intuitive and user-friendly. Moreover, I have reasons to believe that this approach also had a positive impact on the learners' command of L2, by exposing them - resources permitting - to authentic input in all of the project languages, activating their passive knowledge of L2 and supporting their hypotheses about and connections between all the project languages.

Finally, the reading model developed in this project supports extensions to other pairs of related (L2-L3) languages and the learning environment I have implemented is scalable and easily maintainable. Tools are available to harvest ad-hoc corpora that reflect the learners' areas of interest.

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Abbreviations

L1	A person's mother tongue
L2	Second Language - the first language acquired after L1
L3	Third Language – an additional language acquired after L2
SLA	Second Language Acquisition
TLA	Third Language Acquisition
CALL	Computer - Assisted Language Learning
CL	Corpus Linguistics
NLP	Natural Language Processing
POS	Part-of-Speech (i.e. POS information = part-of-speech information)
ST	Source Text
TT	Target Text
SST	Structurally Similar Token
SRA	Suggested Related Article
ARA	Authentically Related Article
M3RM	Multilingual resource-rich reading model – the reading model proposed in this thesis
TREAT	Trilingual REAding Tutor – the name of the learning environment representing the practical implementation of M3RM

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TREAT architecture

This section gives a complete outline of what resources I had in my project, how I manipulated them, and how they are used within TREAT.

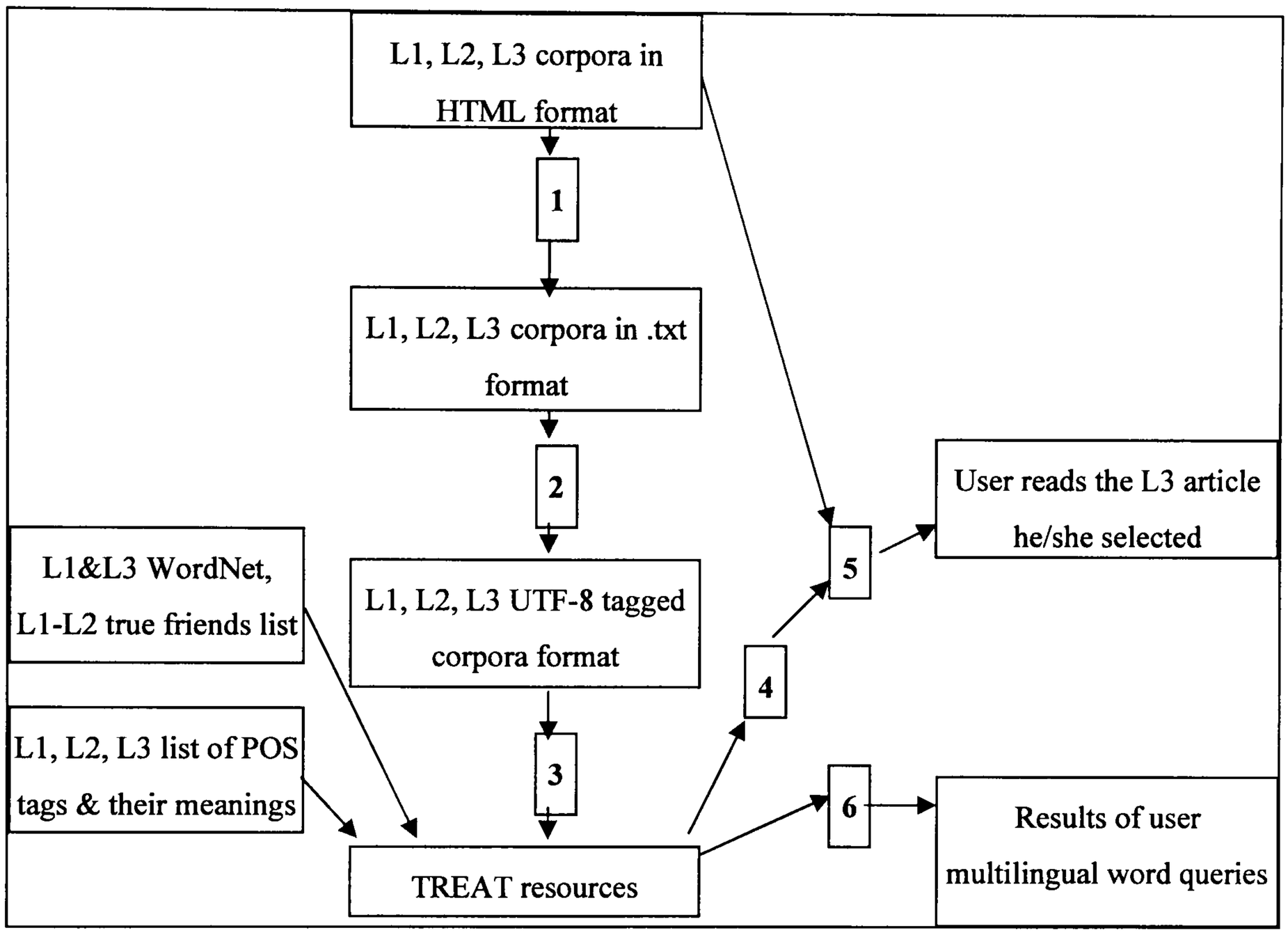

Figure 1: TREAT architecture

1. **Article extractor and tokeniser** (Perl script). It
    a. extracts the article text (title, body - it discards boilerplate text), and
    b. tokenises it
2. Perl scripts that prepare corpora for tagging and lemmatisation, then change their encoding back to UTF-8
3. **Analyser** (Perl script). It does the following:
    a. identifies L3 lemmas
    b. uses the L1, L2, L3 lists of POS tags & their meanings to identify content and function lemmas in all of the project languages

c. using the L3 WordNet, it identifies which L3 content lemmas are covered by the WordNet and, for each one of them, does the following:
    i. using the L3 WordNet, it extracts and stores
        - L3 synonyms
        - L3 related words
        - L3 definition(s)
    ii. using the L1 WordNet which is aligned with the L3 one, it extracts and stores
        - L1 equivalents
        - L1 related words
        - L1 definition(s)
    iii. using the list of L1-L2 true cognates, it extracts and stores
        - L2 equivalents
        - L2 related words

d. using the StringSimilarity Perl module, identifies and stores L1 and L2 lemmas that are structurally similar to (and likely cognates of) L3 lemmas (henceforth called SSTs) – the threshold used is 0.7

e. calculates relative frequencies of all L3 lemmas and also combines them, in order to
    i. store which L3 articles are suitable for the study of a particular morphological category (provided the frequency in the article is 1.5 times higher than in the total L3 corpus)
    ii. store salient L1, L2 and L3 content lemmas for each L1, L2 and L3 article respectively (a salient content lemma is 5 times more frequent in the article than in the corpus)

f. identifies all the realisations of each lemma in the corpus, together with their specific POS and number of occurrences

g. using the bags of salient lemmas identified for each article in each language, as well as the fact that each L3 lemma has L3 synonyms and related words, L1 equivalents and related words, and L2 equivalents and related words, it proceeds to identify potentially related articles
    i. L3-L3

- given article 1 (A1) and article 2 (A2), and
- given the Dice formula $2xy/(x+y)>=T$, where:
    - xy is the number of common salient lemmas between two articles
    - $x+y$ represents the total number of salient lemmas in A1 and A2 combined
    - T is the threshold
- each salient A1 lemma is sought
    - among the salient lemmas of A2; if unsuccessful, then
    - among the synonyms associated with each salient lemma of A2; if unsuccessful, then
    - among the related words associated with each salient lemma of A2;
- if the previous stage proves successful, xy is increased by 1 and the **analyser** processes the next salient A1 lemma the same way
- if the previous stage is unsuccessful, xy is left unchanged and the **analyser** processes the next salient A1 lemma the same way
- given the small size of the test corpora, the threshold T was set at 0.15 (larger corpora will allow a higher threshold)

ii. L3-L2 and L3-L1

- very similar to the L3-L3 process, except
    - there is no searching of the A1 salient lemma among A2 salient lemmas
    - the bags of synonyms and related words are replaced by the bags of L1/L2 equivalents and related words
- initial experiments indicated that the use of bags of structurally similar lemmas in L1/L2 did not have a positive influence on the results because of the

comparatively low accuracy of the Perl StringSimilarity module

h. for each L3 article, finds out the percentage of content lemmas that are covered by WordNet information
i. calculates the lexical density score for each L3 article
j. calculates the length of each L3 article (wordcount)
k. calculates the average sentence length of each L3 article
l. produces new resources (TREAT resources) which enable faster processing when the user queries the materials
    i. L3 file information:
        - file name
        - article title
        - article wordcount
        - L1 related articles in descending order of similarity scores
        - L2 related articles in descending order of similarity scores
        - L3 related articles in descending order of similarity scores
        - if it is useful for the focused study of any morphological category in particular
        - lexical density score
        - average sentence length
        - ratio of content lemmas supported by WordNet information
    ii. L3 lemma information:
        - lemma
        - different realisations of the lemma, together with specific POS tags
        - L3 synonyms, related words and definition(s)
        - L2 synonyms and related words
        - L1 equivalents, related words and definition(s)
        - L1 structurally similar lemmas in descending order of similarity score

- L2 structurally similar lemmas in descending order of similarity score

iii. L3 word information:
- word
- POS
- lemma
- number of occurrences in L3 corpus

iv. L1&L2 lemma information:
- lemma
- different realisations of the lemma

v. L1&L2 word information:
- list of words

4. **Article-selection mechanism** (CGI script). It allows users to select L3 articles according to the following criteria:
   a. the part of speech they want to focus on
   b. article length
   c. article average sentence length
   d. article publication date (the name under which the article was initially saved indicates it)
   e. article lexical density score
   f. number of potentially related articles in L3/L1/L2/all languages
   g. ratio of content lemmas supported by WordNet information
   h. domain (the name under which the article was initially saved indicates it, yet progress is being made in the field of automatic document classification, too, so future work can use this approach instead)

   - Once the user selects his/her preferred criterion, a list of articles that fit that criterion is produced with the help of the L3 file information previously produced by the **analyser**. Each item in the list of articles contains the article id, its title, as well as a button that triggers the **display mechanism.**

5. **Display mechanism** (CGI script). Once the user clicks on the button
   a. the original HTML file is opened and its source is extracted
   b. hyperlinks to images are changed in order to remain active

c. the user sees a two-frame reading window made up of
    i. the article to be read on the left-hand side
    ii. a hyperlink to the TREAT query engine on the top right-hand side
    iii. buttons (under the link to the query engine) which trigger the same display mechanism in order to show potentially related L1/L2/L3 articles for the L3 article in question

6. **TREAT query engine** (CGI script). Users can look up words in L1/L2/L3 provided they select the appropriate language
    a. in the case of all languages, the engine checks first of all if the word exists in the appropriate language corpus. If so:
    b. for an L3 word, the engine uses the TREAT resources for the following:
        i. identify its L3 lemma
        ii. identify what morphological categories the realisations of this lemma belong to – e.g. the Romanian noun *posibilul* and the adjective *posibile* have the same lemma: *posibil*
        iii. extract all the other information stored in the TREAT resources about that L3 lemma
        iv. identify the first L1 and L2 words that occur in the L1&L2 corpora (therefore rendering themselves suitable for concordances) that are among, in order of priority, the equivalents, the related words, and the SSTs of the L3 target word.
        v. perform concordances for the L3 target word, as well as the L2 and L1 ones found to exist in the corpus, too
            - link each word in each concordance line to its POS, so that hovering with a mouse over it brings up its POS, together with its meaning
            - hyperlink each word in each concordance line to the TREAT query engine, so that clicking on it triggers a new search for that particular word in that particular language

- hyperlink each concordance line to the article it comes from; clicking on the link triggers the **display mechanism**

vi. present the user with a results page:
- in the top left area:
  - the L3, L2 and L1 linguistic information found in the TREAT resources (all realisations in all morphological categories found, number of occurrences/POS, synonyms/equivalents/definitions/L1&L2 SSTs)
  - collocations to the right and left of the target word, hyperlinked to the L3 concordance lines which contain them (and which are also sorted according to them)
- in the bottom left area:
  - a small-scale version of the query interface
- at the top, middle and bottom of the rest of the screen, respectively:
  - L3 concordances for the L3 target word,
    - sorted by the concordances to the left and right of the word, in descending order of frequency
  - L2 concordances for the first L2 word found to be an equivalent/related word/SST of the L3 target word and to be also present in the L2 corpus
  - L1 concordances for the first L1 word found to be an equivalent/related word/SST of the L3 target word and to be also present in the L1 corpus

c. for an L1/L2 word, the process is very similar. The engine uses the lemmatised TREAT resources for the following:

i. do a concordance for the L1/L2 target word and display it

ii. identify the first L3 lemma that has the L1/L2 target word among its equivalents/related words/SSTs

iii. if such an L3 lemma is found, take its first L3 realisation and carry out the steps described at point b., leaving out the language of the L1/L2 target word (that step has already been carried out at point c.i.)

iv. if no such L3 lemma is found, find the lemma form of the L1/L2 target word and perform step c.ii with it (by using lemma information in the query engine, displaying useful materials in all three languages becomes a lot easier to achieve).

1 Introduction

1.1 Motivation

1.1.1 Languages – fashion or necessity?

Nowadays, knowing a foreign language is no longer officially pictured as one of the strong signs of belonging to a higher social group. Instead, learning foreign languages is currently part of educational curricula throughout the world, even though, in some regions, such courses are proving more popular than in others (INRA, 2001), individuals more willing to take up opportunities, and course designers more inclined to consider making materials relevant to learners.

Policy-makers at very high levels – such as the EU or UN, as well as members of national ministries for education – have become increasingly aware of the need to encourage and promote foreign language learning in view of the current multilingual and multicultural society. However, in the UK at least, 'language degrees attract a smaller percentage of students from the lower social classes than the average for all subjects' (Footitt, 2005). So what goes wrong where? It seems that language courses are no longer perceived as relevant – and consequently motivating - by potential users, and that significant effort and resources are wasted on the latest technology without researching the best practices in language learning (sections 3.1, 3.2, and 3.3 present in more detail the current debate over the use of technology without first considering the latest second/third language acquisition (SLA/TLA) research – detailed itself in section 2).

A new *Languages Strategy* was proposed in the UK in 2002: '[t]he Languages Strategy demonstrates a commitment to turn this around by encouraging more flexible approaches to language learning and change the way our society values language teaching and learning' (DfES, 2002). It also represents the government's commitment to improve the current situation by making modern foreign languages 'a priority curriculum area from September 2004 for improving teaching and learning post-16' (DfES, 2004). At the higher education level, these good intentions may have reached their goal since reports indicate an increase in the number of students taking language modules with non-language degrees. Nevertheless, they have failed to encourage more undergraduates to take up languages 'either in single honours, joint honours, or in combined degrees' (Footitt, 2005). One also wonders whether there is no intention to remedy the disastrous situation of language teaching and learning pre-16, as well, since at the moment the optimum language acquisition

age is wasted by gradually removing incentives and resources for language learning at primary and secondary school levels.

Another example of increased attention from policy-makers is the *Common European Framework of Reference for Languages: learning, teaching, assessment* which indicates the 'preparation for democratic citizenship [as] a priority educational objective, thus giving added importance to a further objective pursued in recent projects, namely [t]o promote methods of modern language teaching which will strengthen independence of thought, judgement and action, combined with social skills and responsibility' (CoE, 2001). These objectives are consistent with other official documents which also highlight that '[t]he command of more than one language is a fundamental part of the new basic skills required from Europeans in the knowledge society. [...] There is a basic need to improve foreign language learning, including, where necessary, from an early age' (EC, 2002:29). Furthermore, decision-makers have also pointed out 'the political importance at the present time and in the future of developing specific fields of action, such as strategies for diversifying and intensifying language learning in order to promote plurilingualism in a pan-European context' (CoE, 2001). *Plurilingualism* means more than just knowing several languages. It involves knowing the cultures associated with the languages, making correct connections between various cultural events, and responding appropriately to linguistic and cultural stimuli. It is an appealing theory but, as its authors acknowledge, '[t]he full implications of such a paradigm shift have yet to be worked out and translated into action' (CoE, 2001).

Unfortunately, it still seems that such official projects mean well, but fail to meet expectations because initiators do not build a strong enough research basis before making claims or producing materials. In the case of this framework of reference, *learning* – generally considered by specialists as a conscious process – and *acquiring* – a subconscious process – are often erroneously used interchangeably. Statements about how easy it is to learn new languages when you already know others are made without any references to relevant literature. The *Guide for Users* which accompanies the framework reads: 'to acquire a language, it is often considered necessary to learn it, even though it is possible to acquire a language without learning it in a conscious, organised way (as is often the case with immigrants, for example).' Taking into account the presentation of the project, the lack of scientific references and the approach, I fear that at this rate, progress in the field of implementing new policies on language learning will be rather slow.

The benefits of learning languages are not hard to point out and, just like in many other domains of research, the most comprehensive point of view is an interdisciplinary one. Social and economic pragmatists state that the more languages

one is familiar with, the more employable that person is – a recent survey indicates that lack of knowledge equates to loss of business: '[i]n the global economy too few of our employees have the necessary language skills to be able to fully engage in international business, and too few employers support their employees in gaining language skills as part of their job. Language skills audits commissioned by Regional Development Agencies showed that 20% of companies in the UK believed they were losing business because of lack of language or cultural skills' (DfES, 2002). Linguists that believe in the existence of linguistic universals and the universal grammar argue that the innate cognitive structure of humans enables us to pick up accurate, salient grammatical features of any language (Holmberg, 2005) – hence language learning may be less strenuous than originally believed. Moreover, psychologists and educators argue that adult learning – of which foreign language learning is a part - plays a very important role in fighting violence and hatred fuelled by ignorance and narrow-mindedness (Preston & Feinstein, 2004). Nevertheless, this is another example of a significant discrepancy between theory and practice, because 'adult language learning remains an underdeveloped field, especially in vocational education and training' (Chisholm et al., 2004:26).

The EuroCom*Rom* project (section 4.1) set out to reach a wide audience – both young and adult students – and present examples of good practice for learning related languages. Among other issues, it attempted to address some of the fears of language learners regarding age, natural ability, and level of confidence by using the argument of linguistic universals and presenting examples of lexical and morphological similarities between related languages. The project would have benefited greatly from a sound scientific investigation of language learning combined with statistical methods of corpus analysis and an illustration of the effectiveness of data-driven learning (Bernardini, 2002; Johns, 2002). Nevertheless, it was – to my knowledge - the first large-scale multinational initiative aiming to make a particular language family more accessible.

I am convinced that, although teaching techniques need to be adapted to suit the requirements of language learners of different ages, a data-driven approach providing multilingual, varied and motivating input together with unintrusive multilingual support can lead to comparable results to the ones obtained by the popular Canadian immersion programmes. Such environments in which learners are exposed to comparable amounts of written and spoken input in several languages are hard to replicate, yet language resources are abundant and merging them into interactive, multilingual CALL applications which cater both for structured learning and non-structured language acquisition represents the best feasible solution currently available.

The Universal Declaration of Human Rights states that '[education] shall promote understanding, tolerance and friendship among all nations, racial or religious groups' (UN, 1948). At present, when concepts such as globalisation, multiculturalism, plurilingualism, and internationalisation are frequently mentioned, and when people are more mobile than ever before, learning to read in other languages makes the difference between blind reliance on few and potentially biased sources of information and the ability to learn and compare all sides of an argument from local, as well as foreign perspectives. The official view of the European Union is that 'plurilingualism has itself to be seen in the context of pluriculturalism. Language is not only a major aspect of culture, but also a means of access to cultural manifestations' (CoE, 2001).

Consequently, several steps have been taken in order to raise awareness at the European level about the importance of language learning. 2001 was the European Year of Languages and, 'following the success of the European Year of Languages 2001 in general, and the first European Day of Languages in particular, September 26th has been chosen to ensure that language issues have a focal point every year' (EU, 2004b). Moreover, a large-scale study – the Special EUROBAROMETER 54 survey *Europeans and Languages* (INRA, 2001) - was conducted in order to find out what the reality was in this area. The results showed that there is general awareness of the significance of the issue, as 93% of parents responded that it is important that their children learn other European languages, and 72% of Europeans stated that knowing foreign languages is/would be useful for them. Moreover, 71% of respondents considered that everyone in the European Union should be able to speak one European language in addition to their mother tongue, but almost the same proportion thought that it should be English. These statistics show that the general attitude within the EU is favourable towards learning languages – although the people's preference is rather limited. One should also note that, according to this report, only 22% of Europeans do not consider themselves good at languages, which is very important when dealing with adult learners, who are allegedly more prone to being intimidated by the prospect of acquiring a new language than younger learners.

However, when asked about the possibility of actively getting involved in learning languages, and specifically about the level of importance that learning foreign languages holds for them, only 33% of EU residents over 55 years of age indicated a high level, compared to 53% of 15-24-year-olds (Chisholm et al., 2004:27). This situation may explain why language courses for adult learners have not figured among the priorities of training institutions so far. Nevertheless, the preference of younger generations appears to be rather different. Consequently, new

and accessible language-teaching methodologies should be researched in order to meet the needs of the growing multicultural society.

Regarding the languages that EU residents actually knew in 2001 apart from their mother tongue, 41% said English, 19% - French, 10% - German, 7% - Spanish and 3% - Italian. Furthermore, when asked how often they used these languages, only 33% said they used English often, 10% - French, 4% - German and 2% - Spanish.

It is rather worrying that 74% of Europeans do not know a third language. Only 8% and 7% of respondents put down French and English respectively in addition to their mother tongue and a second language (INRA, 2001). Yet, given the positive attitude towards learning languages, it is plausible to expect that, if a novel language learning methodology were designed to build on and improve the linguistic knowledge on already possessed, more individuals would become interested and statistics such as the one mentioned above would change significantly.

Since the publication date of this survey, 10 more states joined the EU and the amount of work that the translation departments of the Union have to cope with apart from the existing backlog represents a big challenge. Research indicates that due to political and financial factors, the EU translation services were unable to prepare adequately for enlargement (Drugan, 2004). Under these circumstances, it is obvious that a novel and efficient reading model is badly needed for professional translators to gain knowledge of languages other than English in order to make the transition from a source text in *language A* to a target text in *language B* much faster and smoother, without the need to use a far more popular *language C* such as English or French as a pivot language. A new survey is also needed at present because the populations of the newly-accepted 10 states are likely to have brought more variety to the linguistic landscape of the EU, and thus changed the realities of language learning and use.

In the meantime, the findings of EUROBAROMETRE 54 have influenced several national initiatives, such as the UK Department for Education and Skills' initiative to implement a National Languages Strategy, motivated by the awareness that the 21st century global society requires increasing language competence and cultural understanding and by the realisation of the need to provide high-quality courses that assist learners in the acquisition of the necessary language skills needed to be successful at work or when travelling. Overall, the British education authority believes that language skills represent the key to the removal of barriers both within the UK and beyond (DfES, 2002). Furthermore, in one of the follow-up reports, adult education receives more attention as the types of language courses that adults can sign up for are diversified. At the same time, government specialists give

accounts of on-coming implementations of digital language courses and place more emphasis on supporting those who choose to become linguists, in the form of public and private sponsorships (DfES, 2004).

Recent publications also urge specialists and decision-makers alike to intensify their efforts to make language learning a priority in practice, too, and not only in their speeches. 'In the market of language learning (at least in Belgium and Europe), supply is unable to keep up with the demand for language courses and materials' (Colpaert, 2004a:76). Moreover, a lot more attention needs to be dedicated to setting up good quality language courses throughout Europe because the materials available on the *Portal on Learning Opportunities throughout the European Space* (PLOTEUS) indicate that there are extremely few, if any, institutions that teach Bulgarian, Czech, Estonian, Latvian, Lithuanian, Romanian, or Slovak outside of the respective countries (EU, 2005).

However, multilingualism in the UK, as well as many other countries, is not simply rooted in European languages. A novel reading model would also be beneficial for learning community languages, which is a growing priority today. Significant effort is being channelled towards developing language resources for such languages, too – such as WordNet's – enabling thus the design and implementation of more complex CALL tools.

1.1.2 A popular CALL?

As already mentioned in section 1.1, efforts are being made to integrate digital resources and applications in various language learning environments, whether in schools or universities. Society is moving constantly towards a 'digital age' (Kol & Schcolnik, 2000) and teachers are now slightly less reluctant to use CALL applications which could complement their face-to-face interaction with students by providing the latter with more resources and, consequently, more exposure to the target language. Despite several shortcomings of using CALL – see section 3.1 - many language trainers have already adopted the new technological approach, and now the focus needs to be on improving the quality of the applications above everything else. The remaining significant degree of distrust on the part of tutors regarding CALL products (Garrido, 2005) can be explained by the fact that, when it comes to collaborations between language teachers and computer specialists, research indicates that they are less than ideal (Felix, 1997; Barrière & Duquette, 2002; Borin, 2002; White, 2005; Yeh & Lo, 2005). Consequently, the results, discussed in more detail in section 1.2.3.5, often amount to applications that are meant to be educational, but are created in the absence of a well-founded approach to language teaching. Nevertheless, as more and more specialists advocate an enhanced interdisciplinary approach, the future of CALL looks bright.

1.2 Problem statement

1.2.1 M3RM – multilingual resource-rich reading model

This is the context in which I developed a novel model to help learners acquire reading skills in a foreign language in a multilingual, corpus-based environment, and thus fill a current important gap in language teaching and research. I call this approach the multilingual resource-rich reading model - M3RM.

To date, the possibility of devising a model to assist a person whose native language is L1 and who has some knowledge of an L2, in learning to read in an L3 which is typologically related to – also called cognate with – the L2, has been under-explored. Similarly, no such reading model has been implemented into an interactive, web-based environment. My project addresses both of these issues and aims to help native English speakers who know French to some extent acquire reading skills in Romanian – a Romance language, like French.

Moreover, I am also addressing the strong need of both professionals and non-professionals for a reading model that could be adapted to support various combinations of related L2 and L3, and then be implemented in scalable environments. Secondly, I am furthering current research in the fields of second and third language acquisition (SLA/TLA) and I am doing this by analysing and combining state-of-the-art findings in several areas connected to my research interests – such as pedagogy, natural language processing (NLP), corpus linguistics (CL) and computer-assisted language learning (CALL), while also keeping track of the recent advances in other fields, like psychology or neuro-imaging.

Given that there are many languages in the world, but comparatively fewer language families, learning to read in a cognate L3 appears as a pragmatically feasible and well-motivated task which is likely to be easier than if the same goal involved a completely unrelated L3 (see section 2.1 for more details). M3RM helps users acquire significant knowledge of the L3 vocabulary and grammar while comparing new language elements and structures with familiar L2/L1 ones, as well as improve their command of the L2. Using this approach to learn to read in an unrelated L3 will still give users the chance of acquiring/reactivating vocabulary in context, as well as background knowledge, in several languages, but is unlikely to benefit from such functionalities as automatic cognate identification.

I have taken up the challenge of combining in an intuitive and user-friendly manner numerous resources that are very valuable for language learning, but which have not yet been brought together and implemented in real language-learning settings. Furthermore, after designing and developing a novel reading model, I have also implemented it in a dynamic CALL environment: TREAT – Trilingual

REAding Tutor. Finally, I tested it on postgraduate students training to become professional translators in order to identify and make necessary improvements. I have thus observed Hegelheimer and Tower's suggestion of using real languages and real students for such evaluations (Hegelheimer & Tower, 2004). I believe that the workflow I have followed should be applied generally to research in my field of interest, yet reports indicate that the most frequent categories that current studies fall into are: research conducted in a lab, but rarely benefiting students; and research that is conducted directly on students without a solid and comprehensive methodological basis:

> Hulstijn (1997) distinguished between two types of SLA studies: laboratory studies intended to provide results relevant to theories of SLA and applied studies investigating instructional methods such as those used in CALL. The ideal in applied linguistics, however, is that research that begins in the laboratory will produce results that might improve learning by, for example, informing CALL. CALL materials designed on the basis of theory-based hypotheses about SLA provide a fruitful setting not only for learning but also for subsequent research. (Chapelle, 2004)

I believe that the adaptation of computational tools that has proven so successful in lexicography – in deriving changing patterns of word usage from very large corpora – could be equally so in CALL, provided they continue to serve sound pedagogical principles. Furthermore, I aim to prove that an effective reading model that benefits from recent advances in both SLA/TLA and NLP can be designed and implemented.

1.2.2 Originality

Using multilingual comparable corpora to study the acquisition of reading skills in a foreign language (L3) represents an original approach to language teaching and learning. The review that was conducted at the beginning of the project on the state of the art in both L3 teaching methodologies and CALL applications targeting L3 learners identified no studies on this subject.

What is even more surprising is the similar lack of well-conducted research into using multilingual corpus-based resources and NLP techniques in second language (L2) acquisition in general. Therefore, given the common points between the two research domains, as well as the fact that the reading model developed in

this project has been informed by both similarities and differences between SLA and TLA, I expect to make contributions to both fields.

1.2.3 Need for this project

It is not only the several hypotheses listed in section 1.3.1 that have determined me to start such a project; many researchers also recognise the need for further investigations in my area of interest. Hammadou (2000) summarises very accurately the concerns of the research community: 'today, most experts would readily agree that much is still not known about what reading comprehension is, let alone how educators can help learners to read better.' The project started from the latest findings about reading and how teachers can help students learn to read better and faster, and then also added *multilinguality* to the equation in order to deliver a more comprehensive and complex answer.

The survey of the state of the art in language pedagogy and computer-assisted language learning highlighted a series of under-studied research questions, such as the need for a sound methodology for the acquisition of reading skills in an L3 – most probably building on existing research on L2 reading - as well as finding the most effective use of existing tools and resources to enhance this process.

Moreover, the novel reading model described in this thesis will also be adaptable to community languages. Knowledge of Arabic can be used to acquire reading skills in Urdu, just as knowledge of Hindi makes learning to read in Gujarati, as well as Urdu, considerably easier.

1.2.3.1 Teaching the unknown?

Not only is the research into learning to read in an L3 still in its early stages – i.e. still looking for common points between learning to read in L2 and L3 (see section 2.1 for a more comprehensive discussion) - but the research world still seems to be unclear about what reading really is, which automatically leads to uncertainty as to what helps and what hinders the acquisition of reading skills. There have been several initiatives to formalise the process of reading (Taillefer, 1996; Chun & Plass, 1997; Spector-Cohen et al., 2001; Grabe & Stoller, 2002; Sun, 2003), yet the debate is ongoing.

Moreover, not enough attention has been paid to the process of reading, as such, despite the fact that the ability to read has been acknowledged as being the most important outcome of language learning (Holmberg, 2005:167 - see the following section). The general approach so far has been to observe it in conjunction with at least one of the other three processes: listening, writing and speaking. Consequently, no multilingual environment in which learners can focus on acquiring reading skills alone has been implemented yet.

At the moment, research into what reading is benefits from contributions linked to a wide range of areas, such as applied linguistics, psychology, computer science, as well as pedagogical theory and practice. These studies range from theoretical reports to practical applications, yet the topic is so complex and involves so many variables on the immediate importance and relevance of which each researcher has his/her own views, that some areas attract far more interest than others. For instance, the number of studies focusing on how infants, children and teenagers – with or without dyslexia, aphasia, autism, or specific language impairment - acquire natural or artificial languages in general far exceeds those dedicated to helping and assessing adults in their acquisition of reading skills in a natural language. So far, most of the experiments involving the latter category of language learners have analysed how they read hypermedia-annotated texts for comprehension (Ariew & Ercetin, 2004), or how well they speak a foreign language (DeKeyser, 2005).

1.2.3.2 Language teaching methodologies

To date, little research has been carried out regarding both the development and practical implementation of a sound and comprehensive model for acquiring reading skills in an L3 while explicitly activating knowledge of an L2 which is typologically related to the L3. The EuroCom*Rom* project (Klein et al., 2002) aimed to shed some light on this matter and produced a number of resources ranging from lists of useful words and morphemes for each Romance language that the project dealt with, to guidelines on what resources may be useful in the foreign language class and how they could be presented. However, the main drawback of the project was the lack of scientific investigation: neither was the project explicitly based on SLA/TLA research, nor were its deliverables evaluated systematically – if they had been, the limited support that they offer to learners would have certainly led to rephrased project achievements. Furthermore, EuroCom*Rom* also lacked feedback from real users - I was unable to find references to the methodology and resources being tested on actual language learners (for more information, see section 4.1).

Holmberg reports on the findings of a survey of distance teaching institutions which were asked to list the above-mentioned four skills in order of their importance and usefulness for the language learner. The result is clear: 'the majority of 167 distance teaching organisations answering a questionnaire regarded **reading and understanding the foreign language** as **the most important study aim**' (Holmberg, 2005:167, my emphasis).

However, as section 2.2 presents in more detail, it is often the case that language curricula do not provide enough time for the development of reading skills (Krashen, 1980:174; Hunt & Beglar, 2005), despite the fact that reading has also

been proven to benefit many other areas of language learning (Pressley in Grabe & Stoller, 2002:91; Sun, 2003).

Furthermore, another reason given for the reduced exposure of L2/L3 learners to texts is the lack of resources. I challenge this view and argue that, on the contrary, there is an impressive amount of authentic reading materials available which would make classes more motivating, but the real problem that language tutors face is the absence of a model to guide the selection, enrichment and presentation stages. Moreover, on the one hand, many tutors lack general ICT, or specialised resource-processing skills (Gabrielatos, 2005; Garrido, 2005). On the other hand, my own experience has confirmed that many resources – such as part-of-speech (POS) taggers and lemmatisers - are only available under certain operating systems and require some training in order to be used effectively.

By analogy with the supervised/unsupervised machine learning phenomena, our users were exposed to both approaches: on the one hand, WordNet resources provided supervised learning scenarios in the case of the majority of L3 content words; on the other hand, the significant body of corpus data and the rarely inaccurate POS tagging and lemmatisation gave learners numerous opportunities to discover and validate their own hypotheses about the L3/L2, as well as correct misleading information provided by NLP tools. They did this well (see section 6.4), proving that the reservations about using NLP tools and corpus resources in language teaching are no longer justified.

1.2.3.3 Choosing the right materials

I have already mentioned in the previous section that one of the challenges for current educators is compiling adequate resources in order to give students the opportunity to practise reading in a given L3. However, when it comes to the question of what exactly an adequate resource is, researchers' views vary and are often vague. Krashen seems to have started this trend with his suggestion that, in order to make progress, language learners should have access to 'comprehensible input' (Krashen, 1980:170). The concept of the *i+1* level which he introduced – suggesting that the input received by learners should be above their current language level only by a small margin in order to support the acquisition of new structures while recognising the large majority of the other ones – is very difficult to capture.

Furthermore, given the many learner differences that have been researched for significant time, as well as the fact that languages are not acquired in linear fashion (DeCarrico & Larsen-Freeman, 2002:28), one cannot do much more than agree in principle with Krashen's argument, but have a hard time identifying exactly the level at which each student is at one particular time, and consequently providing

him/her with 'adequate exposure to language' (Lightbown & Spada, 2001:153). Krashen himself, in fact, seems unsure about what type of input learners should receive: while stating at one point that '[w]e acquire by understanding language that contains structure *a bit beyond* our current level of competence (i+1)' (Krashen, 1980:171, my italics), he also believes that 'rough tuning' the input aimed at language learners is ideal, because, that way, *i+1,* but also 'i and i-n (structures already acquired), plus a bit of i+2, i+3, etc. (structures the acquirer is not ready for yet)' (Krashen, 1980:172) would be provided.

The main flaws with Krashen's argument are that, on the one hand, it is rather vague and that, on the other hand, it does not balance this vagueness which is inherent to the field of language learning – for instance, finding the exact level of a learner's language knowledge is by no means an easy task – with sufficient emphasis on the resources that the learner should have at his/her disposal in order to comprehend target texts and make progress in the target language. The learner need not have to rely only on his/her current knowledge, as well as the surrounding text, when trying to make sense of target text which is beyond his/her current target language knowledge level. Instead, numerous resources are available nowadays to support the reliable acquisition of new structures when consulted at the learner's leisure – e.g. dictionaries, corpora, POS taggers and lemmatisers. Overall, data-driven language learning has been proven as a motivating and effective approach which supports language acquisition and learning (Aston, 2002; Bernardini, 2002; Johns, 2002), while the use of corpora has been acknowledged as scientifically sound given that all results and statistics can withstand objective scrutiny (Leech, 1992).

A more scientific approach to the issue of identifying texts that are suitable for a group of learners – and even organising textbooks based on the findings - is that which uses reading scores (IES, 2004; Taylor, 2004). The most popular ones – which have also been adapted and implemented in various computer applications such as MS Office – are the Fog Index, Flesch Reading Ease and the Flesch-Kincaid grade level. However, relying just on the currently-popular readability algorithms in order to choose texts for language learning purposes is a less than ideal approach for several reasons. First of all, as Nilsson puts it, 'readability measures have typically been used with the native reader in mind, whereas their (at least direct) applicability to second and foreign language reading has not been systematically investigated' (Nilsson & Borin, 2002). Even though there have been attempts on the European side to adapt the algorithms in order to suit other languages, such as De Landsheere's work involving French (in Labasse, 1999), these formulas still cannot measure the semantic difficulty of a passage. Instead, - and this is yet another reason

for being cautious about always using them - they take into account 'surface characteristics of the text' (IES, 2004), such as average length of words and sentences, which are far from playing the most important part in predicting accurately whether language learners will find a particular piece of writing easy to read and understand. In fact, the study carried out in my project indicated that the large majority (close to 90%) of words that were longer than 3 and 4 syllables were understood and translated correctly by learners, and it was the smaller function words that posed problems – section 3.5.

Labasse argues that, at the moment, researchers interested in the field of readability have two options: either to continue devising and testing complex readability algorithms based on new parameters, or to attempt to arrive at a clearer definition of what readability really is, what it involves, and, consequently, how it can be measured accurately.

I chose not to join the race for the perfect reading algorithm, but rather presented users with several relevant text-selection criteria – see section 5.2.4.2 However, I do acknowledge the potential of building adaptive CALL systems that both allow users to make informed choices about reading materials, and cluster texts to suit their predicted level of language knowledge. Building such a complex system – the main aspect of its complexity being making it language-independent - can be explored in future work; given the small time-frame (6 1.5-hour lessons) and user groups (2 groups of 8 and 7 students respectively) involved in the evaluation of M3RM and TREAT, as well as the objectives of the testing phase (acquire as many features of the target language to be able to translate accurately into the mother tongue), the decision was taken to keep the interface as transparent and intuitive as possible.

1.2.3.4 Using corpora for language learning

To date, I have been unable to find any study in which multilingual, comparable corpora processed with NLP tools were used for language teaching purposes. Nevertheless, reports do indicate the usefulness of authentic corpora for language learning, one such example being the identification of collocational patterns in that particular language through concordances – contexts which contain the target word or structure (Ghadirian, 2002; Sun, 2003; Chapelle, 2004; Milton, 2005).

The EuroCom*Rom* project (Klein et al., 2002) suggests scenarios in which short authentic texts could be used in language classes but, apart from the fact that its resources and deliverables are not in electronic format – and are therefore

difficult to evaluate -, there are other significant shortcomings of this initiative – see section 4.

Most studies involving corpora fall under one of the following two categories: the most frequent one involves a monolingual corpus (generally in the target language) which teachers alone, or teachers and students together, query in order to find collocational patterns, as well as a wide range of examples of authentic language usage. This approach can be met in a few language classes and has been called by Gabrielatos (2005) the *condensed reading* model.

The second most frequent scenario involves two corpora consisting of parallel texts which have been previously aligned, so that students can identify translation equivalents, as well as view bilingual concordances and collocations. This scenario is mainly used in translation studies classes, and generally involves more work on the part of the trainer and students because it is not always easy to find pairs of source texts (STs) and target texts (TTs), especially if one is interested in working with languages which are not official in international organisations. Secondly, it also takes time to align the ST and TT at sentence level, and sometimes the concordancing tool can pose problems, too – at the beginning of my project, even with the developer's assistance, it was not possible to display Romanian diacritics in MonoConc and ParaConc.

1.2.3.5 CALL developers without any calling?

The large majority of CALL applications – whether they are distributed on-line or on CD-ROM's – tend to cater for both receptive and productive skills more or – as many researchers in fact argue - less successfully. Several studies point out that, in 25 years of using computers to help language learning, not much progress has been made towards finding out just how to do so well (Barrière & Duquette, 2002; Plass et al., 2003; Rouse & Krueger, 2004).

It is also often argued that many current CALL applications are built without a solid pedagogical framework and without the IT specialists taking too much interest in the intuitions, hypotheses and expertise of language tutors (Felix, 1997; Barrière & Duquette, 2002; Borin, 2002; White, 2005; Yeh & Lo, 2005). The large majority of current digital language learning environments are not scalable, either: the user has access to a limited amount of data – which is often not authentic – and there are few opportunities for individual linguistic investigation outside pre-set tasks.

Under these circumstances, given that most language teaching theories support the idea that students need to be exposed to a variety of resources which should not overload them from a cognitive point of view and through which they should be allowed to work at their own pace and using their own intuitions, as well as

preferences, many current CALL environments fall short of meeting these requirements. Yet the **multilingual resource-rich reading model (M3RM)** which I propose in this thesis addresses these issues.

1.3 Project outline

I aim to fill several gaps in the fields of CALL and third language acquisition by using an approach based on the current best practice in teaching reading and using computer resources in order to enhance the acquisition of reading skills in a foreign language. As far as I know, I am the first to use trilingual comparable ad-hoc corpora processed with NLP tools such as POS taggers and lemmatisers and linked to other linguistic resources - such as WordNets – in order to both construct a reading model and implement it in a dynamic environment tested in a real-life evaluation experiment.

The next two sections spell out my research hypotheses and objectives, followed in section 1.3.4 by the methodology I adopted.

1.3.1 Research hypotheses

I propose a multilingual resource-rich reading model which is based on the following five hypotheses:

1. a multilingual, corpus-based reading model which provides users with extensive reading materials together with other relevant linguistic information extracted using natural language processing techniques is more effective than traditional instruction in helping users acquire reading skills in an unknown L3 which is typologically related to an L2 they have some knowledge of;
2. given an effective learning environment, users can acquire the lexical and grammatical features of the target L3 without traditional explicit instruction;
3. multilingual reading resources can be arranged automatically in multilingual clusters which can expand the users' background knowledge to the necessary level for completing reading tasks successfully;
4. by involving the L2 in the process, the learners will both perceive and appreciate its support function, and seize the opportunity to use and improve their L2;
5. despite the current trend to integrate as much multimedia content in a CALL application as possible, textual resources can be combined in a

dynamic way to provide all the support that learners need in order to become proficient L3 readers.

1.3.2 Research objectives

The first objective was to create a pedagogically-sound reading model (M3RM) that enables users to acquire reading skills in an unknown L3 provided they have a working knowledge of an L2 which is typologically related to the L3 in question.

Secondly, I aimed to apply this model to a real-life situation, and therefore I used it to inform the building of a dynamic CALL environment (TREAT). I chose to study the possibility of teaching English natives with some knowledge of French to read in Romanian.

Thirdly, I sought to compare the performance of learners who only had access to traditional resources – such as bilingual dictionaries – with that of students that used my environment in order to see if my approach was indeed superior to traditional ones.

Fourthly, I gathered feedback from my users about my approach, its implementation and the extent to which they used and appreciated having access to data in all project languages.

1.3.3 Target audience

Translators are among the first ones that come to mind: on the one hand, they can become more marketable and help deal with the current challenges faced by the EU related to the recent and future expansions. On the other hand, they would benefit greatly from having access to a new and effective reading model that would help them improve their knowledge of an L2 they currently know to some extent, while also allowing them to capitalise on all the linguistic knowledge acquired throughout their training and professional career by being able to add another language to the ones they already offer.

Moreover, there is also an ever-increasing body of academics looking for new sources of information in their fields of research. Being able to read the latest research in the language in which it is originally written without having to wait for official translations to be produced, checked and finally published in more popular languages such as English or French, saves time and allows the subjects to become aware and react almost instantly to developments in their research areas.

Finally, given the increasing concern of policy-makers with the students' low levels of interest in languages, the availability of a reading model allowing the rapid creation and deployment of motivating teaching materials could provide educators

with the answer to the challenge of encouraging students to take up and learn to read in an L3 while practising their L2 at the same time.

1.3.4 Methodology

I put the above-mentioned hypotheses to test by devising an effective methodology which I then implemented into a learning environment built according to the best practice in the fields of TLA, SLA, CALL and NLP, as well as my own intuitions. The steps that were followed were:

- compiling trilingual, comparable corpora consisting of news stories in Romanian, French and English in .html format;
- extracting the news item text from each .html page and saving it in a separate UTF-8 encoded .txt file;
- annotating corpora with lemma and part-of-speech tags;
- writing original scripts – using the Perl programming language – to process Romanian and English WordNets, as well as a publicly-available list of English-French true cognates[1], and enrich the corpora with more relevant information;
- the same scripts also compared lemmas, as well as tokens, in all languages and identified those that were structurally similar (SST), some of which were true cognates with L3 target words
- other original Perl scripts identified the most salient lemmas in each text and then, based on them, together with the relevant Romanian, French and English information extracted previously, identified related articles across all three project languages
- implementing an initial learning environment;
- replacing it with a web-based, faster and more accurate version based on the students' feedback.

In this later version of the learning environment, students can choose between working on set tasks, and selecting their preferred article in Romanian based on a series of criteria that the specialist literature considers relevant for language learners. They can search for unknown words in Romanian and obtain concordances, together with relevant linguistic information, in up to three languages.

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[1] http://french.about.com/library/vocab/bl-vraisamis-a.htm

Chapters 5 and 6 contain more detailed information regarding this methodology, structure of the learning environment, experiment, data analysis and findings.

2 Learning a foreign language

The research hypotheses and objectives listed in the previous section emphasise the strong language learning component of my work. M3RM builds on the latest findings in the fields of second and third language acquisition. At the beginning of the project, the number of studies in the field of TLA was much smaller than those relating to SLA, despite statements that TLA is significantly different from SLA, and that, consequently, every aspect of language learning that was investigated in the context of the subject's second language should also be examined in the case of the user's third language. Furthermore, TLA studies were generally focused on young children, and CALL applications generally used monolingual resources, with very few implementations involving bilingualised dictionaries and none using trilingual materials.

As a result, my research into the acquisition of reading skills in a third language and my intention to use multilingual comparable corpora and NLP tools to create a sound CALL environment takes the current foreign language teaching approach and practices to a new level, where multilinguality, pedagogy and technology are combined in the ideal way dreamt by researchers such as White (2005), Yeh and Lo (2005), Barrière and Duquette (2002), Borin (2002), and Felix (1997). Although my work focuses on the field of TLA, I have also studied recent advances in the field of SLA, in order to build a comprehensive and pedagogically-sound methodology.

The Holy Grail of language teaching has always been finding a methodology, together with appropriate resources, that would enable learners to become proficient in the target language quickly and reliably. Politics adds at present to the pressure by becoming increasingly involved in language learning at European level, although the situation seems to be reversed in the UK, as the national curriculum no longer makes languages an obligatory study subject:

> The command of more than one language is a fundamental part of the new basic skills required from Europeans in the knowledge society. [...] There is a basic need to improve foreign language learning, including, where necessary, from an early age. [...] The Community has for a significant time emphasised the importance of language learning in Europe and promoted it as a key dimension of education, culture, citizenship and employability (EC, 2002).

Many methods have been tried – the direct method, reading method, immersion programmes, connectionist and exemplar-based models, as well as teacher-oriented or learner-oriented approaches (Schmitt & Celce-Muria, 2002:4-13) - but despite clear steps forward, due to the many individual learner differences and to the fact that learning a new language involves so much more than storing lists of target words, the conclusion still remains that it is 'difficult to say much with complete certainty about language learning and use' (ibid, p.15). I took up the challenge of researching the best practices in teaching reading, CALL and NLP, and then designing and implementing a more effective reading model which would both accomplish the project objectives and be portable to other language combinations.

Conventional language-learning courses deployed in educational institutions focus on all four language skills: receptive – *reading* and *listening* - as well as productive ones – *speaking* and *writing*. However, motivated adults interested in gaining rapid access to information written in a foreign language very often do not have the necessary time to enrol in such courses which are likely to provide little input and practice – or even overlook altogether the particular domain they are interested in. A specialised translator working in the automotive industry or an academic researching the treatment of a particular virus may not profit too much from weeks of exposure to basic guidebook phrases, focus on attaining near-native pronunciation, or emphasis on writing a perfect dinner-party invitation in the target language.

This situation is also acknowledged by many language-teaching providers, who no longer place the four skills on the same level, but rather in a hierarchy dominated by reading (Holmberg, 2005:167). However, no effort has gone in deploying multilingual reading courses for beginners, with or without the use of CALL applications.

In the fields of SLA and TLA, the extremely complex nature of the study object, together with the many variables that need to be controlled, occasionally mean that very strict scientific evaluation methods are more difficult to implement than, for instance, in the field of NLP. Consequently, there are various anecdotal statements that are sometimes presented as informed research, such as '[a]ccording to folk wisdom, additional languages are acquired by bilinguals and multilinguals more easily than by monolinguals' (Cenoz, 2003). Yet research to date is not conclusive: the studies that Cenoz mentions both support and challenge such statements. Therefore, more systematic experiments are needed in order to identify more reliably the circumstances and environments in which bilinguals are better than monolinguals at acquiring foreign languages.

Another 'popular saying' which has a narrower scope holds that knowledge of an L2 enables subjects to read in a cognate L3 without too many problems: '[u]nless some other variable is present (e.g. a very similar second language) the comprehension of a foreign language authentic text is usually unattainable with beginners in the traditional setting' (Leffa, 1992) – see section 2.1. However, although the L2 can be of help in the acquisition of an L3, it is important to determine as accurately as possible how much, under what circumstances and especially how this knowledge of L2 can be used efficiently to speed up the process of L3 acquisition.

The EuroCom*Rom* project (Klein et al., 2002), meant as a 'necessary complement to the language teaching provided in schools', intended to spell out a methodology for activating the students' knowledge of second languages in order to comprehend texts written in related foreign ones. Yet it seems that its deliverables were not tested in real language-teaching scenarios. As a result, there was very little practical research that could be built on when devising M3RM.

The small-scale experiment conducted at the end of my project indicates that M3RM can be superior to traditional approaches to learning to read, yet more research is needed before generalising the results. By building on already-available materials, it appears that TREAT provided its users with sufficient relevant and useful resources and support to enable them to acquire rapidly both L3 and L2 knowledge. When conclusively proven effective and sound, TREAT can serve as an example of a scalable and easily-maintainable implementation of a novel reading model.

2.1 Influence of the L2 on L3 acquisition

Several SLA and TLA specialists (Lightbown & Spada, 1999; Cenoz, 2003; Sun, 2003) agree that acquiring an L3 is very likely to benefit from the L1 and L2 linguistic systems that the learner is already familiar with: 'third language learners have the possibility of using two languages as base languages in third language acquisition as compared to second language learners who can only use their first language as the base language' (Cenoz, 2003). I also believe in using one's knowledge of an L1 and L2 as a safety net in the process of acquiring a related L3. It was a natural exercise then to survey the current specialist literature in order to find out whether the second language always acts as a stepping stone when learning an L3, or whether its contribution is negligible.

At the moment, exactly how L1 influences the acquisition of L2 is still an open question, and even more work needs to go towards fully identifying the L2

phenomena influencing L3 acquisition. My thesis also explores this aspect to some extent, as the users involved in the evaluation of M3RM and TREAT have reported making use of L2 knowledge in order to acquire L3 lexical items (nouns, pronouns, adjectives, verbs and adverbs, many of which are cognates and are used in similar structures), as well as grammatical phenomena such as past tense formation and use (L2 and L3 share the *Auxiliary* + *Past Participle* structure).

Most of the research in TLA has been conducted on bilinguals learning a third language, who are not the main target audience of my research. I am aware that the results of such research can be potentially misleading for my project, yet I chose to investigate them first of all because there was a lot less evidence in my field of interest, and secondly because the findings of studies in related areas is often both informative and beneficial.

Schmitt and Celce-Muria's caution about what language learning and use in general really imply is shared by other specialists in the field, who also mention more specific aspects. Cenoz, for example, believes that '[a]part from rate, there is also the possibility that third language acquisition could present qualitative differences when compared to second language acquisition. That is, bilinguals could follow a different route when acquiring a third language than monolinguals acquiring a second language' (Cenoz, 2003). Nevertheless, despite such uncertainties, schools and universities throughout the world continue to offer language courses, while researchers keep assessing them and recycling, combining or even devising new language-teaching methodologies that should have a better impact on learners.

Although the preferred topic of TLA researchers is the investigation of the performance of bilinguals when acquiring a third language, Cenoz and Hoffmann outline that the number of such studies is still very small compared to what it should be in order to allow the drawing of sound conclusions: 'while there is extensive research on the effect of bilingualism on cognitive development and metalinguistic awareness (e.g., Bialystok, 1991, 2001), the particular effect of bilingualism on subsequent language learning has not received much attention' (Cenoz & Hoffmann, 2003). The presence of an L2 is currently viewed from a more comprehensive perspective, as having the potential to help L3 acquisition, but also hinder it: '[t]he processes used in third language acquisition may be very similar to those used by L2 learners but, as Clyne points out "the additional language complicates the operations of the processes"' (Cenoz, 2001).

However, several studies have been conducted in order to shed light on this issue (Hammarberg, 2001; Cenoz, 2003). The majority of the conclusions are encouraging, if vague:

'[t]hird language learners have already acquired two other languages, either simultaneously or consecutively, as first or first and second languages. Therefore the knowledge of these two languages and the experience of the acquisition process of another language **are likely** to influence the acquisition of a third language' (Cenoz & Hoffmann, 2003 - my emphasis);

> 'studies that have directly focused on TLA provide ample evidence that **prior L2's actually have a greater role to play than has usually been assumed**' (Hammarberg, 2001 - my emphasis).

Research in the acquisition of all L3 skills indicates that, when it comes to speaking, learners often borrow terms from their L1 or L2 in order to compensate for insufficient knowledge of L3 (Hammarberg, 2001). The pattern that has been identified is that 'linguistic typology has proved to be influential in the choice of the source language. Speakers borrow more terms from the language that is typologically closer to the target language, or using Kellerman's (1983) concept of psychotypology, the language that is perceived as typologically closer' (Cenoz, 2001). Furthermore, learners have been noticed to use their second language as a *supplier* 'in the learner's construction of new words in the third language, and also in her attempt to cope with the new articulatory pattern in the third language' (Hammarberg, 2001).

It was thus to be expected that, when reading, the participants in my experiment would resort to their L2 in order to understand the written L3 – both in terms of vocabulary and grammar. The feedback received indicates that, overall, users did perceive written Romanian as being more similar to an L2 they knew to some extent - French, Italian or Spanish - than to their L1 – English - and that they found the provision of comparable reading materials in the L2 helpful – section 6.5.

I am aware that, in order for M3RM to be proven exhaustively, more experiments need to be conducted, in which the L1 and L3 are not related in any way - in my study, English and Romanian share some vocabulary with the L2, French. However, the ground is being laid for further experiments at the Leeds University Centre for Translation Studies, in which the L1 and L3 will be further apart - the L1 will still be English, but the L2 will be Russian, and the L3 Bulgarian, Polish or Ukrainian. These experiments will provide more evidence on the learners' use of the L2 for acquiring the related L3.

Cenoz reviewed a significant number of studies conducted in order to find how bilingualism can assist or deter TLA (Cenoz, 2003). One of the main conclusions was that, with regard to general aspects of L3 proficiency, bilinguals tend to appear superior to monolinguals, while in the case of analysing specific aspects of language proficiency, the situation is more balanced.

Cenoz gave evidence that bilinguals perform better than monolinguals when acquiring an L3 by quoting work by, among others, Ricciardelli (1992) in South Australia, who studied 57 Italian-English bilinguals and 55 English monolinguals; Cenoz (1991), who wrote about 321 bilingual (Basque-Spanish) and monolingual (Spanish) secondary school students who were acquiring English as a third language; Lasagabaster (1997, 2000), who extended the previous study and also compared the level of proficiency in English obtained by 252 bilingual and monolingual children in the Basque Country; and Sanz (2000), who assessed 124 Catalan-speaking bilinguals also proficient in Spanish, and 77 Spanish-speaking monolinguals from a different area of Spain outside Catalonia, completing tests of grammar and vocabulary in English (Cenoz, 2003).

On the other hand, no significant difference in the performance of bilinguals and monolinguals was found by researchers such as Jaspaert and Lemmens (1990), who looked at 'the acquisition of Dutch as a third language by Italian immigrant children who also received instruction in Italian and French in the Foyer Project'; Schoonen, van Gelderen, de Glopper, Hulstijn, Snellings, Simis, and Stevenson (2002), who 'focused on proficiency in written English by native speakers of Dutch and immigrants who are bilingual in their L1 and Dutch and learn English as a third language'; and Zobl (1993), who 'used a grammaticality judgment test to measure several structures such as adjacency of verb and object, indirect and direct object passive, indirect and direct object wh-movement' with '18 monolingual and 15 multilingual learners of English' (Cenoz, 2003).

Given the inconclusiveness of the research to date, as well as my different audience and project aims, M3RM was developed because of the increased probability of the target audience to benefit from this novel approach. First of all, nobody disputes that '[t]hird language acquisition shares many characteristics with second language acquisition but it also presents differences because third language learners have more language experience at their disposal as second language learners, are influenced by the general effects of bilingualism on cognition, and have access to two linguistic systems when acquiring a third language' (Cenoz, 2003).

Secondly, it is also argued that bilinguals focus more on form in order to differentiate between the languages they speak. (Bialystok, 2001:151). This goes together with the statement that, due to the general nature of L2 instruction and the

focus on teaching 'vocabulary, grammar and discourse structure from the very beginning', L2 learners develop an explicit knowledge of the second language, while they only usually have an implicit knowledge of L1 (Garcia, 2000, in Grabe & Stoller, 2002:44).

Both arguments indicate that an online language-learning environment providing extensive linguistic information from a variety of resources without explicit teaching is much more appropriate in the case of acquiring an L3 than an L2. If the L2 and L3 are typologically related, then it also likely that the linguistic features of the latter will be more easily spotted and retained.

Finally, knowledge of a second language has been proven helpful when the learner had to distinguish between salient features and noise in the third language:

> By considering the acquisition of word awareness, syntactic awareness, and phonological awareness, there is evidence in each case for bilingual advantages and disadvantages in certain tasks. An interpretation that fits a good part of the data from these studies is that reliable bilingual advantages occur only for those tasks that are based primarily on the ability to selectively attend to information where there is competing or misleading information present. (Bialystok, 2001:151).

2.2 Benefits of extensive exposure to authentic language

The survey of the latest research in SLA/TLA (Leffa, 1992; Aston, 2000; Grabe & Stoller, 2002:21; Schmitt & Celce-Muria, 2002:4-5; Sun, 2003; Hunt & Beglar, 2005) indicated that students are likely to benefit from being exposed to large quantities of authentic materials. One the one hand, researchers such as Leffa argue that, by being exposed to authentic materials, learners will, at worst, improve their knowledge of the world and, at best, both improve their world knowledge and their command of the target language (Leffa, 1992). On the other hand, it appears that the problem of authenticity is a controversial one and has resurfaced in recent years (Römer, 2004:152-153), with 'some [researchers and practitioners] going so far as to argue that [authentic target language] corpora can intimidate learners (Gabbrielli, 1998), or disempower teachers (Dellar, 2003)' (Gabrielatos, 2005). Widdowson (2000), for instance, argues that a corpus can be considered authentic only to some extent because it is largely de-contextualised – the onus being on the language tutors to re-contextualise it. Furthermore, Widdowson also points out that language learners are hardly ever the intended audience of the texts that make up

corpora, which implies that using this type of resource for teaching languages is flawed.

Nevertheless, exposing learners to a variety of instances of genuine language use not covered by textbooks is an effective means of preparing them for further contact with language in authentic contexts. Consequently, the majority of specialists still support the use of authentic materials. The use of made-up contexts to teach a foreign language – such as in Mondria's study (2003) – is heavily criticised by a number of researchers: Firth believes that the made-up examples that can be found in textbooks are 'just nonsense' (in Römer, 2004:154), while Sinclair states that it is 'an absurd notion that invented examples can actually represent the language better than real ones' because 'language cannot be invented; it can only be captured' (ibid.). Finally, de Beaugrande argues that invented examples may 'hinder the development of fluency by excluding data samples that fluent speakers actually say' (ibid.). Aston takes this last idea one step further and argues that, in fact, 'traditional language teaching syllabuses and materials ignore many linguistic features that are frequent in native-speaker data, and emphasise ones which are relatively rare' (Aston, 2000:8), a practice which is undoubtedly detrimental to the learner.

M3RM addresses these issues by using multilingual authentic materials together with NLP techniques, and by allowing users the freedom of consulting the project resources at their own pace and according to their own interests. The traditional 'decontextualised teaching of vocabulary and syntax [phase which occurs] before the student is ready to be exposed to authentic texts' (Leffa, 1992) is not supported by the multilingual resource-rich reading model. Consequently, M3RM also addresses an issue highlighted, among others, by the EU Directorate-General for Education and Culture: '[m]aking learning more attractive means first of all making it relevant for the individual.' (EC, 2002:24)

One of the points that all researchers agree on is that students cannot learn to read in a foreign language without having access to resources in that language. Consequently, a reading model built on a scalable set of authentic materials is likely to familiarise the target audience both with the way in which the L3 works and also with salient features of various registers in the L3. By analogy with Biber et al.'s statement that 'any competent speaker of a language [needs to have] control of a range of registers' (Biber et al., 1998:135), it is reasonable to expect that the same control needs to be acquired and exercised by L3 readers, as well. Yet, there appears to be one significant paradox that governs the field of reading instruction: on the one hand, 'results from [...] immersion programmes, such as those initiated in Canada but which now exist elsewhere, showed that learners could indeed become quite

fluent in an L2 through exposure without explicit instruction, and that they developed excellent receptive skills' (Schmitt & Celce-Muria, 2002:7); on the other hand, researchers indicate time and again that most language curricula do not provide students with enough exposure to print (Ghadirian, 2002; Grabe & Stoller, 2002:21; Schmitt & Celce-Muria, 2002:4-5; Sun, 2003; Hunt & Beglar, 2005):

> With L2 students, what is often overlooked is not the fact that L2 students need grammar instruction to be readers but rather that, like developing L1 readers, they need countless hours of exposure to print (that they are capable of comprehending successfully) if they are to develop automaticity in using information from grammatical structures to assist them in reading. (Grabe & Stoller, 2002:23).

The specialist literature in the field of SLA often states that learning to read in a second language is a time-consuming, far-from-trivial process: '[a]n individual's competence at reading extensive texts in a foreign language depends to a large extent on the passage of time and on the amount of practice in reading' (Evans, 1993). Along the same lines, Felix points out that '[r]eading in a second language [...] is challenging and students often complain about the time it takes them to look up endless references in order to understand even the gist of things' (Felix, 1997). Moreover, 'at beginning L2 levels, students' strongest resources are their L1 language and reading abilities and their knowledge of the world' (Grabe & Stoller, 2002:52).

In a TLA setting, students would normally have to make the effort of remembering L2 and L1 phenomena that seem connected with the particular L3 one that is under investigation at a given time. This is a successful strategy which is currently used in traditional language learning settings and has been integrated in M3RM, too: 'we know from experience that students learn about grammatical constructions and phenomena more actively when these constructions are discussed by comparing the system found in their native language with that of another language' (Saxena & Borin, 2002).

Apart from the SLA and TLA view that more exposure to language is beneficial for L2 or L3 students, important findings from the field of neurology also support this argument with studies that involve functional magnetic resonance imaging (fMRI) of the subjects' whole head. The conclusion of such a study conducted on 12 multilingual subjects in order to 'investigate the hypothesis that in multilingual speakers different languages are represented in distinct brain regions' was that '[l]arger foci of brain activation were found for the nonfluent languages,

suggesting that less exposure to a language requires a larger neural network for its processing' (Vingerhoets et al., 2003).

The counter argument to exposing learners to authentic materials is that these may be too difficult for them: 'the use of authentic materials entails risks in matching levels accurately (texts may be too easy or too difficult for learners, even if pop-up glosses are added), content may be ethically or culturally inappropriate (Kayser 2002). Linguistic accuracy might also be a problem.' (Colpaert, 2004a:51). Nevertheless, this issue can be easily addressed in a corpus-based environment which includes sufficient resources to offer a wide choice of topics, as well as language levels to its users. NLP techniques can be of invaluable help in arranging and presenting materials.

Moreover, although many researchers acknowledge that exposure to authentic reading materials is ideal (Foucou & Kübler, 2000:67-68; Sun, 2003; Römer, 2004; Garrido, 2005:184-185; Milton, 2005) - e.g. '[t]he best topics are the "hot" ones' (Foucou & Kübler, 2000:72) - not many studies actually implement this recommendation from the first day of L3 reading instruction. The EuroCom*Rom* project was among the first to use a combination of authentic reading materials with explicit teaching of reading skills, but when I evaluated the resources it produced, they proved less useful than intended and they were difficult to implement in real-life language learning scenarios. To be more specific, under section 6.5.5 – *The Structure Words of Romanian*, the project listed a combination of words, individual morphemes and structures amounting to 147 items, arguing that '[t]hey make up 50-60% of the vocabulary of an average text'. It was not stated how and why these words/phrases/morphemes were selected. When one of exercise texts listed in section 3.6.11 – *Exercise texts. Newspaper advertisements* was analysed, a series of limitations became obvious. First of all, selecting such materials as advertisements was fundamentally flawed because there is no evidence in SLA/TLA research that language learners at the beginner level benefit from exposure to elliptical sentences whose usage outside the already-mentioned genre is very limited indeed; moreover, the project did not present any evidence to justify this choice. Secondly, it became evident that the list of structure words did not cover 50-60% of the text as initially stated, but 11.4%.

Overall, it seems to be the case that, despite efforts from computational linguists or even from computer-inclined language teachers to create useful NLP tools that could be used for preparing valuable reading resources automatically, the large majority of teachers cannot be easily persuaded to make the most of them. As a result, although language tutors are urged to collaborate with computer specialists in order to design pedagogically-motivated CALL applications, quite often this

collaboration does not take place. The subsequently-published CALL materials rarely go beyond the intuitions of computer specialists about what the best practice in language teaching should be (Felix, 1997; Borin, 2002; White, 2005:56).

The same seems to be happening in the more general field of language learning where, despite new approaches receiving favourable reviews, old habits die hard:

> In spite of significant change over the last decade in many countries and/or institutions, education and training systems in Europe still tend to remain in many ways turned upon themselves, paying more attention to teaching than learning, focusing more on curricula than on learners and valuing abstract academic quality more than relevance. Greater cooperation is required with a broader range of actors in business, research, social partners and society at large. (EC, 2002:27)

2.3 What is reading and how do we learn to read in L2/L3?

Learning a foreign language is usually viewed as becoming a competent speaker, writer, listener **and** reader. Most language courses currently available aim to help learners develop all these skills, although reading, writing, listening and speaking are not considered to have the same significance – the literature indicates that being able to read and understand a text in a foreign language is the first and most important goal of such courses. Furthermore, there are numerous individuals who do not actually need to be proficient in all the four language skills. However, before moving any further I would like to point out the fact that this project does not address the issue of learning a different script before being able to understand written text in the target language - as would be the case if one tried to use one's knowledge of Vietnamese (which uses the Roman alphabet) when learning to distinguish/disambiguate/acquire Chinese characters.

No reading course should be designed without a clear knowledge of what reading actually involves, yet one potential problem is that there are several approaches to defining what reading entails. Nevertheless, investing time in researching the currently-known aspects of reading can only result in improved reading curricula and support materials.

One approach is to see reading in terms of both the lower-level and higher-level processes it involves. The former category comprises 'the more automatic linguistic processes [that] are typically viewed as more skills oriented' (Grabe & Stoller, 2002:20). Such processes are: '*lexical access* (word recognition); *syntactic*

parsing [which is very important when identifying the appropriate meaning of a polysemantic word for a given context]; *semantic proposition formation* [which involves combining word meanings and structural information into clusters of meaning], [and] *working memory activation*' (ibid., my italics). By contrast, the higher-level processes include: '[the] *text model of comprehension* [which implies identifying, then combining the main and supporting ideas of a text into a coherent whole]; [the] *situation model of reader interpretation* [which involves the reader using his/her background knowledge and expectations in order to arrive at an individual interpretation of the text in question]; *background knowledge use and inferencing* [which is of great importance when the reader progresses from assessing clause-level meaning units to the text model of comprehension, a prerequisite for formulating the situation model of reader interpretation]; [and the yet not completely understood] *executive control processes* [such as monitoring comprehension, using appropriate strategies at appropriate times, reassessing goals and repairing comprehension whenever necessary]' (ibid.).

Another view is that reading is essentially the combination of *decoding (word recognition)* and *comprehension* skills (Grabe & Stoller, 2002:36). *Comprehension*, in its turn, is a very complex process, too:

> Comprehension means more than a good vocabulary. It involves a number of core language skills, such as the ability to use syntax to anticipate words in a sentence and assign unknown words to the appropriate part of speech. It includes an aptitude for monitoring context, making inferences on the basis of background knowledge, as well as familiarity with oral or literary forms (genres). (McGuinness, 2004:211)

The functional aspects of reading have also been used in order to define it – e.g. whether one works on a text in order to find occurrences of a word, a particular item of information, its main ideas, or connect its topics with those of other texts and place all of them in a larger picture. Taillefer, for instance, suggests that reading to identify small pieces of information should be distinguished from reading for meaning (Taillefer, 1996). Thus, '[t]here are [...] five basic processes involved in reading a text [...]. These processes, or reading gears, are called scanning (Gear 5), skimming (Gear 4), rauding [normal reading, simple reading] (Gear 3), learning (Gear 2), and memorising (Gear 1)' (Carver in Grabe & Stoller, 2002:12). However, each one of these last five processes involves different strategies and skills – for more information on reading strategies, see section 2.3.1.

Scanning is considered an

‘”easy”’ form of reading, whose purpose is to ‘locate specific predetermined graphic symbols within a text. The reader’s visual activity exhibits “a mixture of rapid inspection of the text with an occasional closer inspection and does not necessarily proceed line by line” (Pugh, 1978:53). Little information is processed with an aim of remembering or even understanding, as scanning is a cognitive matching task of what is sought and what is given.’ (Taillefer, 1996)

Skimming, on the other hand, is a more difficult ‘reading style’, which ‘refers to the process of discovering the author’s message without significantly reflecting on it. The reader follows the text in a linear and sequential fashion but may glance back. Mental processing involves organizing and remembering textual information.’ (ibid.) Rauding, or ‘reading for general comprehension[,] will use a balanced combination of text model comprehension and situation model interpretation. [Finally, r]eading to learn will first emphasise the building of an accurate text model of comprehension, and then a strong interpretative situation model that integrates well with existing or revised background knowledge’ (Grabe & Stoller, 2002:29).

All these views do not contradict each other, but are progressively more detailed. Even if they group elements in different categories, there is significant overlap. The underlying idea is that reading is generally a complex process, and so becoming a proficient reader implies mastering several low and high-level trainable competencies.

The next step in the review of the field was to see what relationship had been found between reading in an L1 and reading in an L2/L3, and whether this research had been used to inform the design of CALL environments. I learnt that, with regard to the second language, ‘[i]n moving from scanning to reading for meaning, the weight of L1 reading decreases as that of L2 proficiency increases’ (Taillefer, 1996). The implication of this finding was that, if M3RM were to be helpful for translators who frequently need to summarise, as well as translate, it needed to offer sufficient support for a rapid and effective acquisition of target language knowledge.

Current CALL applications group the different reading styles under the more general label *reading comprehension* and assess the students’ performance in scanning, skimming, and general comprehension tasks using *multiple choice* and *cloze* exercises. Yet it has also been shown that such assessment methods are often inappropriate, and tutors should firstly become aware of this issue, and secondly find alternative ways of assessing student progress. McGuiness points out that, among other flaws, multiple-choice tests are ‘forced-choice tests and are susceptible to

guessing'. They tend to include few items and even fewer choices, which implies that subjects need to have much higher scores at the end of the test than 50%: '[t]o score significantly above chance at $p<.05$ on a two-choice test (true-false) containing ten items, a person must get eight or more correct (not five, as many people believe).' Also, McGuiness' research indicates that, despite these problems, 'multiple-choice tests are the most common measure used in vocabulary research' and the degree of ignorance regarding their flaws among researchers and tutors is still high: 'I have not come across any studies where the researchers knew how to address this problem, and most were unaware it was a problem' (McGuinness, 2004:221).

Learning to read in a second language has been proven to be a much more complex process than previously thought: 'it is now evident that L1 reading skills do not automatically transfer to the L2 context, nor do reading processes in different languages appear to be exactly the same, particularly among beginning L2 readers' (Grabe & Stoller, 2002:71). It also seems that there have not yet been enough studies investigating 'the ways in which the interchange among linguistic systems affects L2 processing performance' (Muljani, Koda and Moates in Grabe & Stoller, 2002:55). This argument could be extended to include the acquisition of L3 reading skills, the additional language being likely to complicate the equation even further (Clyne in Cenoz, 2001).

It is clear that learning to read in an L2 or L3 needs to become a priority and be treated more seriously in language courses. Although students need exposure to a wide range of reading resources varying in domain, text function and degree of difficulty, few language curricula meet these requirements (Krashen, 1980:174; Hunt & Beglar, 2005): 'students learn to read by reading a lot, yet reading a lot is not the emphasis of most reading curricula' (Grabe & Stoller, 2002:90).

Moreover, becoming a good reader does not stop at recognising words faster. Instead, '"[…] extensive reading promotes fluency, vocabulary, and background knowledge"'. (Pressley in Grabe & Stoller, 2002:91). Sun expands on this idea, by arguing that

> Studies have shown that extensive reading is the key to achieving higher reading proficiency (Krashen, 1993; Green & Oxford, 1995). Krashen (1993) has even suggested that free voluntary reading (FVR) is the key to student improvement in reading skills, linguistic competence, vocabulary, spelling, and writing. According to Hayashi (1999), extensive reading provides learners with rich background knowledge, vocabulary recognition skills,

> and higher motivation for more reading. In addition, it can also lead to the development of rapid reading skills, and the discovery of reading strategies. (Sun, 2003)

Yet, invariably, the large majority of researchers who advocate the usefulness of a sound reading curriculum (Krashen, 1980:174; Grabe & Stoller, 2002:91; Sun, 2003; Hunt & Beglar, 2005), also point out that in reality very few steps are taken to implement one. Consequently, the situation that characterises language learners and courses nowadays is closer to the bleak – yet accurate - picture painted by Stoller and Grabe:

> 'Much of the battle in getting students to develop reading skills rests with their attitudes towards reading. These days, however, most students read little in either the L1 or the L2, and they do not enjoy reading. The lack of motivation is also reflected in L2 curricula where reading itself is not given a high priority in terms of class time. Both teachers and students come to feel that there are "more important things to do". Students too often are uninterested (as are some teachers), and curriculum developers and administrators have unrealistic expectations about how quickly fluent reading abilities can be developed (without a lot of practice in reading) (see also Dornyei, 2001b)'. (Stoller & Grabe, 1993:89).

Many studies compare and contrast the development paths corresponding to L1, L2, and (less often) L3 readers. However, what is occasionally overlooked is that, unlike L1 readers, more often than not, L2 and L3 beginning students have not been exposed to a large amount of L2 or L3 spoken language before seeing printed texts in the L2/L3. Research indicates that American 6-year-olds are very likely to have a vocabulary of 5,000-7,000 words when reading instruction starts (Grabe & Stoller, 2002:43). By comparison, the acquisition of reading, listening, writing and speaking skills in an L2 or L3 is a synchronous process, and thus L2 and L3 students do not have the luxury of benefiting from a long period of initially passive, then gradually active language intake. All they can rely on is their L1 and world knowledge.

The debate regarding what helps and hinders reading in a foreign language is not over yet. Is the bottom-up approach inferior to the top-down one? Do L2 learners pay more attention to lower-level processes than L1 readers (Horiba in Chun & Plass, 1997), and can they rely on resources at higher or lower level – such as background knowledge – 'to compensate for deficiencies at one level (e.g., word

recognition)' (Chun & Plass, 1997)? Is reading in a foreign language ultimately a language problem or is it a function of the subject's reading proficiency in his/her first language – the Linguistic Threshold Hypothesis (LTH)? Is it the case that, once the subject becomes a proficient reader in his/her L1, these reading skills are automatically transferred to any languages he/she learns subsequently - the Linguistic Interdependence Hypothesis (LIH) (Chun & Plass, 1997)?

Grabe and Stoller do not believe that reading in any second/foreign language is simply a matter of transferring L1 reading skills to the new context and they reference research that supports the LTH, while also pointing out that the level of the threshold depends on the difficulty of the task the learner aims to complete:

> The clear conclusion of [L1 reading versus L2 language knowledge] studies is that second-language knowledge is more important than first-language reading abilities, and that a linguistic threshold exists which must be crossed before first-language reading ability can transfer to the second-language reading context. However, it is clear that this linguistic threshold is not absolute but must vary by task: the more demanding the task, the higher the linguistic threshold. (Alderson in Grabe & Stoller, 2002:51)

My stand is that there are indeed too many differences between learners to formulate a single hypothesis and expect it to apply to all of them. I do not consider any of the current theories as inherently wrong, yet I do believe they are incomplete: they are formulated in a way which implies that they apply to all categories of learners, whereas one can hardly compare school children and adults in terms of processing power and world knowledge, to give a simple example. A more useful way of conducting research would be to identify a target audience, construct the experiment based on the theories that relate to that particular audience and avoid generalising the results.

The current literature indicates that beginning L2/L3 readers should only be required to carry out reading tasks provided they have significant support for increasing their language knowledge and consequently lowering the threshold. Teachers and dictionaries represent the traditional means of support, yet alternative mechanisms can be found to help students acquire L3 vocabulary and reading skills more effectively. M3RM is one such alternative. Furthermore, another vital aspect that these studies highlight is that, although L1 reading skills are not automatically transferred to the L2/L3 context, they do have an influence on the learner becoming a proficient L2/L3 reader, therefore reading courses should also provide students

with opportunities to practise and improve their L1 reading skills – but they never do.

2.3.1 The beginner L3 reader's tools

Many specialists who support the theory of interactive models of reading (Spector-Cohen et al., 2001; Grabe & Stoller, 2002:33; Ariew & Ercetin, 2004) argue that what new language readers can rely on are 'three main interrelated components: language proficiency, background knowledge, and metacognitive strategies' (Bernhardt in Ariew & Ercetin, 2004). The relationship between these components was summarised as follows:

> A threshold level of language proficiency is a requirement for effective use of reading strategies and background knowledge (Devine, 1988). However, the linguistic threshold is a function of background knowledge and text. In other words, it varies from text to text and from reader to reader based on the amount of background knowledge they bring with them as they read. (Ariew & Ercetin, 2004)

2.3.1.1 L3 proficiency

2.3.1.1.1 Acquiring L3 vocabulary

The specialist literature points out repeatedly that 'vocabulary development is a critical component of reading comprehension' (Grabe in Chun & Plass, 1996). Certain researchers take this argument even further, arguing that 'vocabulary is most important, syntax least important' (Chun & Plass, 1997), while DeCarrico adopts Krashen's view and mentions an alternative that 'some have recommended, [which] is not to adopt a grammatical syllabus at all, reckoning that the grammar that students need to learn will become apparent as they work on meaningful content' (Krashen, 1980:173-174; DeCarrico & Larsen-Freeman, 2002:32). I adopt a more balanced view, as M3RM aims to help learners acquire both lexical and morphological features of the target language.

It is possible that progress could be made more rapidly if the concept of 'comprehensible input' were defined in a more transparent way than simply by adopting Krashen's formula $i+1$, where i is the language level at which a learner is at a specific point in time. Once a set of clear criteria were drawn to distinguish between 'comprehensible' and 'incomprehensible' input, then more effective methods of selecting and using text resources to teach reading could be implemented. M3RM has been informed by current studies in order to identify as complete a set of relevant text-selection criteria as possible, and then integrate it to identify and present useful resources to users.

Despite the increased focus on developing the learners' L2/L3 vocabulary, there are not sufficient examples of new approaches that would support the acquisition of numerous lexical items rapidly. Traditionally, lexis has been decontextualised and taught explicitly using drills, vocabulary cards, etc. Nowadays, despite studies indicating that students acquire more vocabulary when they perceive it is relevant to them than what teachers often try to convince them to learn (Nelson in McGuinness, 2004:216-217), and despite recommendations to let individuals explore authentic materials according to their own interests (Leecs in Bernardini, 2004:16), students are still required to practice old techniques in new digital environments. Such a transposition of ineffective exercises into high-tech environments is unlikely to lead to any significant progress; instead, tasks should benefit from current advances in the field of NLP. Additional information such as lemma, POS, collocations, frequency, authentic context, etc., can make vocabulary much more relevant to students and thus increase the chances of its acquisition. Users should acquire knowledge of both 'lexical items of the language and their associated patterns' (Clear, 2000:30). Finally, the selection of teaching materials is still not done according to a unitary and effective model, and it would be interesting to see whether there is any relationship between text-selection criteria and vocabulary acquisition rate.

Grabe and Stoller argue that, although the development of a significant vocabulary in the new language is undoubtedly important – also given the fact that L2/L3 beginning readers do not possess lexical knowledge comparable to their L1 peers - there is still no precise estimate of the size of the L2/L3 recognition vocabulary that learners should possess. Moreover, the same authors also emphasise the fact that current language courses do not cater for the acquisition of sufficient lexical knowledge. Although Krashen's *communicative approach* and emphasis on 'successful communication' as the necessary and sufficient prerequisite for language acquisition (Krashen, 1980:171) have become very popular, later research indicates that they are not as effective as intended:

> a large vocabulary is critical not only for reading but also for all L2 skills [...] Yet the means for developing a large vocabulary are not consistently developed in L2 reading instruction, nor is the issue typically given a high priority in L2 instructional contexts. Moreover, we are not sure just how large the recognition vocabulary base needs to be for fluency, though it is likely to represent a major dilemma for developing L2 readers. (Grabe & Stoller, 2002)

Under these circumstances, the initiative to experiment with a reading model which does not emphasise communication as much, but which is based on rich resources, appears fully justified. M3RM provides users with sufficient materials to enable them to attend both to the form and the meaning of unknown words, a functionality which has been indicated as beneficial for integrating 'newly met vocabulary effectively into long-term memory' (Prince, Schacter and Graf in Hunt & Beglar, 2005).

Nation and Meara's have found that '[t]here are four major strategies that help with finding the meaning of unknown words and making the words stay in memory [...]. These strategies are guessing from context clues, deliberately studying words on word cards, using word parts and dictionary use. These are all powerful strategies and are widely applicable' (Nation & Meara, 2002:44). Consequently, M3RM has been designed to support the use of these strategies in a trilingual context.

Overall, I adopt the view that, in the field of translation studies, while vocabulary is important, knowledge of syntax is vital because readers need to be able to process information at the intersentential level, as well, in order to work out meanings of words as part of an accurate overall meaning of the text (Chun & Plass, 1996).

2.3.1.1.1.1 Teaching/learning strategies aimed to increase vocabulary size

Pre-reading and post-reading activities are considered among the most effective methods of encouraging and supporting students to acquire new lexis, though specialists acknowledge the fact that more research is needed in these areas. These activities are also highly recommended for increasing one's background knowledge – see section 2.3.1.2. Their main advantage lies in their being much more engaging than the 'definition-based activities that require relative shallow cognitive processing found in many reading textbooks' (Hunt & Beglar, 2005). Furthermore, the same authors state their disappointment with the vocabulary consolidation activities provided nowadays by 'many commercially-produced materials', as they generally do not 'encourage the deep, meaningful processing of the target lexis [but rather] an over reliance on matching vocabulary items with their L2 definitions because definitional knowledge is not what is needed in the on-line processing of language' (Anderson & Nagy, and Prince in Hunt & Beglar, 2005). Explaining the relationships between words, as well as the use of traditional approaches such as vocabulary cards, are also viewed by Hunt and Beglar as effective techniques.

The TREAT query engine, together with its mechanism of identifying related texts automatically and across languages is faster than traditional methods and results in a wider range of contextualised resources to suit more of the learners'

needs and interests. These resources can be used in pre and post-reading exercises both in order to expand the learner's background knowledge and to provide opportunities to notice salient vocabulary, view it in as large a number of contexts as possible, learn its collocational patterns, link it to the other words they are familiar with in L1, L2 and L3 – the concept of 'semantic maps' – as well as extract the meaning of each sentence and link it to the background knowledge and the other sentences in the text – the concept of 'conceptual graphs' (Barrière & Duquette, 2002).

Researchers also speak of *input noticing, input flooding* and *conscious-raising tasks* (Gamper & Knapp, 2001a; DeCarrico & Larsen-Freeman, 2002; Nation & Meara, 2002; DeKeyser, 2005; Garrido, 2005) and point out that, if the linguistic features of the L2/L3 are not made salient to the students, they will not be acquired.

I challenge the current approach to making vocabulary salient either by glosses, or by teachers (Hunt & Beglar, 2005), because it involves manual effort from tutors either to bring lexis to the students' attention or to annotate it with translations, and rarely involves authentic resources. Similar flawed instructional practices that ignore valuable corpus data involve teaching less frequent – and occasionally obsolete – grammatical structures before more frequent – and consequently more useful – ones (Gabrielatos, 2005).

Looking for cognates – that is words that have the same origin or are related in some way to words in other languages – is arguably another example of an effective strategy that speeds up the process of identifying meaning in the L2/L3 and acquiring vocabulary. Although Grabe and Stoller are still cautious about the usefulness of cognates (Grabe & Stoller, 2002:49-50), other researchers are fully convinced both of their effectiveness and wide use. Mokhtari and Reichard reference studies by Jimenez et al. which point out that bilingual readers have a clear understanding of the relationships between words and structures in their two languages, and consequently are able to use cognate identification to support an accurate comprehension of reading materials (Mokhtari & Reichard, 2004). However, despite this strategy receiving sufficient support from researchers at a conceptual level, there have not been many studies that focus on how L3 learners use their L1 and L2 knowledge in order to identify cognates in the L3.

M3RM emphasises the use of cognates because research points out that a significant number of users have studied a second language at some point and so, if all their knowledge were contextualised, their acquisition of reading skills in a third language would be faster and more effective. In Europe, it used to be the case that language learning was an important aspect of education: in 1987 it was reported that 83% of young adults had studied a second language during their instruction time

(Cook in Schmitt & Celce-Muria, 2002). Surprisingly, although increasing emphasis is placed in the UK on learning to live in a multilingual, multicultural society, language courses – with the exception of Spanish courses - are becoming less popular. This contradiction reflects a flawed approach at the decision-making level: one cannot expect to educate citizens towards tolerance and understanding, and motivate them to learn about each other's cultural backgrounds, without encouraging them to learn the languages that represent those cultures. There are sufficient examples of cognate languages in Europe since there are several Romance, Germanic and Slavonic languages spoken on this continent, but the situation is no different when it comes to Iranian or Indo-Aryan languages. When M3RM is adapted to other scenarios, one could easily create motivating and useful resources to help language teaching overcome its current difficulties.

A *collocation/collocate* is defined in the Cambridge Dictionary as 'a word or phrase which is frequently used with another word or phrase, in a way that sounds correct to people who have spoken the language all their lives, but might not be expected from the meaning' (CUP, 2005). The main word in these multi-word units cannot be freely substituted with another one, because all effect would be lost (Nation & Meara, 2002:36). Overall, although research shows that much of language is made up of multi-word units (Schmitt & Celce-Muria, 2002:13), learners do not often have the chance to identify and study collocations for vocabulary they are interested in. The development of corpus-based approaches to language teaching, as well as of concordancing software, has led to a new model of 'condensed reading' (Gabrielatos, 2005), which has been proven to be effective in monolingual settings, but which is still more frequently met in research rather than language classes.

So far explicit instruction and learning of collocations have been indicated to promote fluent reading – in fact, Hunt and Beglar believe that knowledge of collocations is 'essential if EFL learners are to become highly proficient readers' (Hunt & Beglar, 2005). Consequently, M3RM, together with its practical implementation TREAT, provide a mechanism for the automatic identification of collocations.

Finally, one should not overlook the fact that it is not just the quality of the instruction that is responsible for the learner's success, but also his/her intelligence and motivation (Lightbown & Spada, 2001:135; Yeh & Lo, 2005). Although strategies are helpful, the ideal method of teaching them to students is still to be found (Schmitt & Celce-Muria, 2002). Consequently, it is very important to design CALL applications that are based on sound pedagogical principles, but also user-friendly, intuitive and motivating so that they support individual students' exploration and acquisition of the target language(s).

2.3.1.1.1.2 From using reading strategies to acquiring reading skills

Research has highlighted that skills are in fact automatised strategies: '[s]kills are, in essence, essential academic habits. [...] The appropriate label [strategy or skill] rests on whether the reader consciously evokes the procedure or is simply functioning in a typical, automatic way' (Alexander and Jetton, 2000 in Grabe & Stoller, 2002:15).

Since the project aims to train proficient readers in an L3, it was relevant to learn about the benefits of using strategies in relation to the acquisition of skills. The conclusion that specialists favour is that both strategies and skills are important in that the former represent the transition to the latter, which is the ideal any language learner should aim for:

> An emerging skill can become a strategy when it is used intentionally. Likewise, a strategy can "go underground [...]" and become a skill. Indeed strategies are more efficient and developmentally advanced when they become generated and applied automatically as skills. Thus, strategies are skills under consideration. (Paris, Walker and Turner in Grabe & Stoller, 2002:16)

The following is a list of reading strategies identified by Grabe and Stoller (2002:16) - which was used to inform the design stage of M3RM – together with my own views:

1. 'specifying a purpose for reading' – the project target audiences are already motivated by the need to understand a text in order to translate it, or expand their background knowledge on the subject;
2. 'planning what to do/what steps to take' - conventional CALL environments tend to restrict the choices of the users, therefore more material-selection criteria to suit more needs are desirable;
3. 'previewing the text' – learners should be allowed to make contact with texts both on their own and in the context of multilingual related materials;
4. 'predicting the context of the text or section of text';
5. 'checking predictions' – M3RM is effective in this area due to its provisions for multilinguality and complete automatisation;
6. 'posing questions about the text' – this is considered to be the best way of assessing the learners' comprehension, while traditional methods such as *cloze tests* or *multiple choice questions* are overrated

(DuBravac & Dalle, 2002; McGuinness, 2004). However, checking these questions in an automatic environment and giving feedback is difficult to implement and can represent the topic of future research.

7. 'finding answers to posed questions' – M3RM aims to find the best way of combining the most relevant resources in order to enable users to employ this strategy successfully;
8. 'connecting text to background knowledge' – M3RM addresses this issue of building/expanding one's background knowledge by describing a mechanism that enables the automatic selection of multilingual related materials;
9. 'summarising information' - is one of the main tasks that the target audience of this project need to perform in their professional careers;
10. 'making inferences' - the research world (Van Parreren & Schouten-van Parreren, 1981; Chun & Plass, 1997; DuBravac & Dalle, 2002; Grabe & Stoller, 2002; McGuinness, 2004; Hunt & Beglar, 2005) is currently debating whether this strategy is indeed effective; my approach is to provide more supporting materials to enable both a higher proportion of correct inferences and a higher probability of self-correction;
11. 'connecting one part of the text to another' – the initial motivation for starting to read a text is likely to determine users to employ this strategy, too;
12. 'paying attention to text structure' - I argue for an approach to teaching reading which emphasises extensive exposure to authentic materials in a variety of forms, so that salient features such as text structure, words and collocations are obvious to the learner (see section 2.2);
13. 'rereading' - this is one of the strategies that are most widely used in traditional lessons: learners are required to read the same fragment at different times with different goals in mind; M3RM enables the completion of these goals in a more motivating environment, built on a variety of dynamically-combined resources;
14. 'guessing the meaning of a new word from context' – the effectiveness of this strategy is discussed in more detail in section 2.3.1.1.1.2; at the moment, extremely few CALL environments are using sufficient resources to support and encourage users to employ this skill, so the published results on its usefulness can be misleading;

15. 'using discourse markers to see relationships' – accurate comprehension of the source text depends on mastering this skill, yet few CALL environments provide sufficient resources to study discourse markers in authentic contexts;

16. 'checking comprehension' – supporting this strategy is almost impossible to implement in an environment built using the latest NLP techniques without involving manual intervention from language tutors; consequently, users can either use authentic resources in conjunction with face-to-face learning, or rely on validating their intuitions and hypotheses using the materials available;

17. 'identifying difficulties' – I hypothesise that by being able to choose between a significant range of text-selection criteria, users will have enough support to work on the issues they find more challenging (e.g. discourse structure, morphology, and collocational patterns) – see section 1.3.1.

18. 'taking steps to repair faulty comprehension' – research by Hunt (2004) indicates that learners who are already familiar with a second language are indeed able to correct erroneous hypotheses provided they have access to enough support materials;

19. 'critiquing the author' – based on their comprehension of the text, together with the background information provided by the multilingual related materials, learners can assess the author's point of view from a critical perspective;

20. 'judging how well objectives were met' – the project target audience already have significant control mechanisms in place and can evaluate themselves to some extent; however, this strategy is similar to the one described at point 16, and the same comments apply to it;

21. 'reflecting on what has been learned from the text' – once again, the advantage of working with a professional audience is that they are always keen to track their own progress, reflect on recent advances and put everything into context.

Research also indicates that, in order to become a successful reader, one not only needs to be aware of what strategies to use, but also know how to use them and especially how to link them to other strategies in the most effective way (Yeh & Lo, 2005). This knowledge is a component of metacognitive knowledge and it is not necessarily related only to the language-learning process, so learners should be trained to develop and use it as early as possible.

For metacognitive knowledge, Flavell (1979) suggested that knowledge of three variables could influence a person's performance. These variables include: (1) personal variables: knowledge about oneself as a learner, i.e., one's cognitive strengths, weaknesses, abilities; (2) task variables: knowledge of what kind of information is hard or easy to remember; and (3) strategy variables: knowledge of how to use a strategy, what strategies are available, and how well a strategy works. (ibid.)

Designing a methodology for improving one's metacognitive strategies is beyond the scope of my project; however, educators should strive to equip their students with such knowledge from an early age so that they become independent learners:

> 'Metacognitive strategies involve regulating, directing, monitoring and evaluating one's language learning; effective learners apply metacognitive knowledge and strategies by planning their approach to the task, monitoring their comprehension and production for overall meaningfulness (Chamot and O'Malley, 1994) and using strategies flexibly (Gu and Johnson, 1996)' (Hunt & Beglar, 2005).

For example, in the case of reading a passage, users will need to know at which point in their progress it is ideal to 'infer vocabulary meaning, use a dictionary, or ignore lexis' (Hulstijn in Hunt & Beglar, 2005).

2.3.1.1.1.2.1 Inferencing

Current approaches to vocabulary learning over-emphasise the role of the teacher and do not focus enough on improving reading materials and fostering incidental vocabulary acquisition. 'Many teachers would assume that vocabulary learning stems mainly from the direct teaching of words in the classroom. However, vocabulary learning needs to be more broadly based than this.' (Nation & Meara, 2002:39). Given that '[l]earning from meaning-focused input, that is, learning incidentally through listening and reading, accounts for most first language vocabulary learning' (ibid.), more effort should go into developing reading models that support this type of learning.

One of my aims is to address this issue by presenting an effective model of assembling and processing reading materials in order to support a faster and more accurate acquisition of L3 lexis and morphology. The project language corpora were

designed and stored in formats that could be used by NLP tools. Learners also had several mechanisms available which they could use to test their hypotheses about the new language (L3) in order to extract meaning from the text they were reading. This reading model addressed therefore the argument made by Pienemann - in (Lightbown & Spada, 2001:135) - that not all the features of a language can be taught and that in some cases the learner needs to go through a series of developmental steps at his/her own pace before acquiring a certain feature. A similar point was also made by Krashen in his presentation of the input hypothesis (Krashen, 1980:169).

There have been studies (Mondria, 2003) which suggest that the meaning-inferred approach is approximately as effective as the meaning-given one. Yet such studies are not without limitations. First of all, the subjects were 14 to 16-year old children who have limited inferring skills compared to adults. Secondly, the contexts to which the subjects had access were not authentic, but artificial ones:

> a pregnant-sentence context (in some cases a definition) was constructed on the basis of contexts found in vocabulary textbooks, learner dictionaries, and monolingual dictionaries. In cases where there was some doubt as to whether the students would know the words in the context sentence, the translation of these words was given (Mondria, 2003).

Thirdly, learners had access to only one context per target lexical item, which ignores recent research in reading comprehension and vocabulary acquisition which states that the number of instances a learner needs to encounter a word in meaningful context before remembering it is between 5 (Ghadirian, 2002) and 10-12 (Coady, 1997). Therefore, the study did not take into account the fact that '[e]xtensive word exposure is necessary in order to ensure a deep and solid embedding of new words in the mental lexicon' (Gamper & Knapp, 2001a), as well as in order to have the opportunity of making inferencing and evaluating their validity, because '[g]uessing a meaning for a word from context clues is the most useful of all the strategies' (Nation & Meara, 2002:44).

Moreover, neither were the subjects trained to infer meaning from context, nor was their learning environment complex enough to allow lateral thinking, multiple access to resources, and expansion of background knowledge. When it comes to training, Nation and Meara believe that it 'should focus on linguistic clues in the immediate context of the unknown word, clues from the wider context, including conjunction relationships, and common-sense and background knowledge' (Nation & Meara, 2002:45). Corpus-based CALL environments like TREAT ensure that

students receive contextualised, multilingual resources, through which they can browse according to criteria that are salient to them. These features have also been found useful by studies conducted by Nagy&Herman and Nelson, who have noticed that saliency in the context of the text under study played a very important role in the acquisition of new vocabulary, especially of rare words (in McGuinness, 2004).

Such attempts to compare the effectiveness of meaning-inferred and meaning-given approaches were potentially triggered by Krashen's argument that '[a]cquisition is slow and subtle, while learning is fast and obvious' (Krashen, 1980:177). Under the circumstances in which researchers still do not agree on the most effective model of language acquisition, my approach was, once more, to develop a hybrid model, providing both opportunities for hypothesis-making and validation through extensive exposure to multilingual authentic reading materials and concordance lines (the *acquisition* element), together with multilingual dictionary access for a section of L3 content words (nouns, adjectives, verbs and adverbs) and presentation of POS tags for all tokens (the *learning* element). Nevertheless, given that there was no language tutor at hand, all textual resources were processed automatically, and because the L3 function words (pronouns, conjunctions, prepositions, and interjections) did not have the same amount and quality of supporting materials, there were situations in which misleading information was presented alongside accurate data. In order to discard the inaccurate information, the learners that evaluated TREAT needed to formulate hypotheses and test them using the project corpora. They reported using the corpus data very frequently, which combined with the fact that their performance in a number of tasks involving the L3 improved very quickly, suggests that merging acquisition and learning does not result in medium speed, as one would naturally expect, but in fast and obvious progress, too.

A longer and more complex evaluation of M3RM is nevertheless needed before making any claims about combining inferencing and learning with rapid and effective results. In the meantime, the research world is still debating whether inferencing actually works in the language classroom. On the one hand, there are arguments mentioning the fact that *comprehension* involves the building of an accurate mental model - in which *inferencing* plays a very important part (Spector-Cohen et al., 2001). In the context of using extensive authentic materials, inferencing is sometimes considered as the most successful strategy which still needs to be taught in order to yield the best results (Nation & Meara, 2002:44). Examples are given from the process of L1 acquisition, during which learners use contexts to verify word identification and disambiguate its meaning (Perfetti in Spector-Cohen et al., 2001).

Some critics argue that low-ability students will have problems making correct inferences (Folse in Hunt & Beglar, 2005). However, research indicates that this strategy benefits all kinds of users and that, given varied materials and a supportive enough learning environment, students can learn both to infer and check the validity of these inferences: '[b]y reviewing the available contextual clues and checking the correct meaning found in the dictionary, learners will need to practice re-evaluating their incorrect inferences so that they do not retain them' (Parry in Hunt & Beglar, 2005). In fact, even though Mondria outlines the potential problem of students making incorrect inferences which can become fossilised, evidence from his own study indicate that correctly-inferred words are retained better than incorrectly-inferred ones. It is justifiable therefore to believe that frequency of exposure to contexts will lead learners to correct their inferences, since inferencing is a complex process which draws on 'deep processing of the unknown word, as a result of which all kinds of links (elaborations) are formed between the word, its meaning, the context, and the already present knowledge of the learner' (Anderson, Ellis, Hulstijn in Mondria, 2003).

Moreover, it is also believed that even in the case of 'minimally useful contexts', even low-ability students can find useful information and can get an insight into the workings of the L2/L3: '[l]ess proficient learners can benefit from training in how to carefully analyze context because, even in minimally helpful contexts, they can acquire knowledge of such features as word form, affixation, part of speech, collocations, referents and associations, grammatical patterning, as well as global associations with the topic' (Nation in Hunt & Beglar, 2005). TREAT provides students with more information than standard concordance packages because the research world highlights the importance of combining resources and activities: for instance, Sun and Hunt&Beglar suggest mixing contextual inference with vocabulary cards and dictionary look-up – especially with bilingualised dictionaries, which are combinations of monolingual and bilingual dictionaries (Grabe & Stoller, 2002:75; Laufer and Hadar in Nation & Meara, 2002:46; Fraser in Sun, 2003; Hunt & Beglar, 2005). TREAT implements these recommendations, and provides even more relevant lexical and grammatical support in up to three languages.

Any language has both content words – nouns, adjectives, numerals, verbs, and adverbs – and function words – prepositions, conjunctions, articles, auxiliary verbs and particles. Most of the function words have a signalling function – that is, they predict in which direction the discourse is going - i.e. various relationships between sentences, such as example/illustration, cause/effect, contrast, addition, conclusion, etc.: '[s]ignal words help the reader discover the overall structure of the text and

gain a better understanding of the author's message' (Barrière & Duquette, 2002). Nevertheless, research indicates that content words have a signalling function, too, as their referent can be found either earlier or later in the text, but also outside it, as background knowledge (Winter and Tadros in Flowerdew, 2003).

The design of M3RM took into account the fact that signal words are believed to be the hardest to understand (Richgels, McGee, Lomax, & Sheard in Barrière & Duquette, 2002) – and, consequently, to acquire. As a result, M3RM provides more support for understanding and acquiring them than any other reading model to date. Among other resources, users of TREAT have access to concordances, which are in fact '[c]orpus samples [that] lend themselves to work on reading skills, and, in particular, to developing strategies for inferring the meaning of unknown lexis in the text' (Gabrielatos, 2005). Section 6 presents in much more detail the effectiveness of the approach of combining concordances with WordNet-specific information – such as bilingual definitions, synonyms/translation equivalents and related words for content words - and collocational information. The last category gives users the chance to consider content and function words together and infer their correct meanings, as well as predict the correct direction in which the discourse is moving.

While one stand is that good readers do not use guessing from context and inferencing (Stoller & Grabe, 1993:29; Grabe & Stoller, 2002:34), an opposing one holds that

> inferring vocabulary meaning from context [...] is an essential strategy for developing reading comprehension and promoting lexical acquisition and **is commonly employed by successful language learners**. [...] careful attention to context is necessary for confirming the correctness of explicit word analyses and locating appropriate subentries in dictionaries. Specific procedures may improve the probability that inferences will be at least partially correct. However, since no research has yet to show the efficacy of different procedures, instructors and learners will need to experiment with and adapt the following to create their own procedure. (Hunt & Beglar, 2005 - my emphasis)

L1 learners are reported to use this strategy extensively (Ghadirian, 2002), yet unlike L2/L3 learners, they are also exposed to much more language in context. Consequently, M3RM uses extensive multilingual, comparable corpora within a scalable framework, thus allowing the expansion of resources to meet the real needs of the users.

Inferencing is also seen to be a very useful strategy for acquiring grammar, as well as vocabulary:

> With the rise of generative grammar and its view of language as a system of rules, grammar learning was seen to take place through a process of "rules formation", which itself was brought about when students formulated, tested and revised hypotheses about grammatical structures in the target language. (DeCarrico & Larsen-Freeman, 2002:28).

More than that: it has been argued that grammar is best learnt implicitly, while students are working on samples of an unknown language: 'grammar was best learnt subconsciously when students were engaged in understanding the meaning of the language to which they were introduced' (Krashen and Terrell in DeCarrico & Larsen-Freeman, 2002:28). Yet there are no studies on the effect of exposure to multilingual resources on the learners' L2 and L3.

The approach I adopted is based on the current findings regarding the acquisition of both lexis and grammar and aims to provide users with a lot of support for formulating, testing and validating hypotheses about all the languages in question.

2.3.1.1.1.3 Improving reading skills in a foreign language

There are many views on what is involved in the process of becoming a proficient reader, and especially how important each element is – some argue in favour of a large foreign language vocabulary; others for an extensive amount of background knowledge; others yet for the consistent choice and use of reading strategies. I aimed to learn about all these elements, as well as the different settings which have been tried, together with the tools, materials and outcomes in order to inform M3RM, as well as its practical implementation, TREAT.

There have been several reports on the stimuli and resources associated with language learning to which students respond best, and how this is reflected in their acquisition of reading skills.

One such report indicates that improving the traditional language-teaching framework by exposing students to more authentic linguistic input and giving them more chances to recycle the knowledge they acquire through various tasks in which they have to use both the receptive and productive language skills represents in some respects a more effective way of learning a foreign language (Rodrigo et al., 2004).

Rodrigo started from Krashen's debated comprehensible input theory and constructed two scenarios which were both believed to be better than traditional ones: the first one – called the 'intensive reading' class - involved suggested and chosen reading and the second one – the 'reading-discussion' class - comprised assigned reading, followed by debate. The two groups of 'fourth semester students of Spanish as a foreign language at the university level in the US' eventually performed better than a control group - that had attended traditional classes 'emphasizing explicit instruction of Spanish grammar and vocabulary' – in a check-list vocabulary test and a grammar test, but no differently from the control group in a cloze test (ibid.).

Other researchers (Chun & Plass, 1997; Cenoz, 2001; Hammarberg, 2001; Chapelle, 2003) have investigated how L2 or L3 learners move away from the traditional textbook and learn to use other available resources, such as dictionaries. It was found that, because L2 and L3 learners tend to spend far more time at word level than L1 learners - who usually adopt a top-down approach - resources such as dictionaries are far more used by the former group, especially when they are still in the early stages of learning to read in the L2/L3. It has also been found that it is mainly the low-proficiency students - also having a lower verbal working memory - who use dictionaries to a significant extent (Chapelle, 2004; Prince in Hunt & Beglar, 2005). However, the same researchers outline that in order to obtain better results, students should not be left alone with the target text and a dictionary because there are many more useful resources – such as bilingualised dictionaries, which combine the advantages of monolingual and bilingual ones - and activities – e.g. pre-reading and post-reading ones – that can make the learning process even more motivating.

M3RM was designed to provide useful linguistic support when requested by learners, as well as to stimulate pleasure reading because, in the case of vocabulary acquisition, '[j]ust reading for pleasure was shown to be at least as effective, or more effective, than traditional instruction' (Rodrigo et al., 2004). This novel reading model was inspired, among others, by van Lier's triple A approach to curriculum design: '*Awareness, Autonomy, Authenticity*' (in Garrido, 2005:184-185), Bernardini's studies on learner autonomy (2000, 2002, 2004), as well as research by Biber & Reppen (2002) which indicates that data-driven learning is a felicitous substitute for rigid and obsolete textbooks. Furthermore, the target audience of this project - professional translators - and the participants in the evaluation experiments - trainee translators at postgraduate level – were believed to have the necessary aptitude towards autonomy in order to make full use of the many functionalities of TREAT. Consequently, numerous resources and activities were built into TREAT in

order to address in an effective way the issue raised by researchers such as Hunt and Beglar: '[a]lthough extensive reading probably accounts for much of L1 and advanced L2 learners' knowledge of reading vocabulary (Nagy, 1997; Nagy and Herman, 1987), in my experience, many EFL reading programs do not provide a sufficient amount of richly contextualized, comprehensible input.' (Hunt & Beglar, 2005) – for an extended discussion of TREAT, see section 5.2.4. I am also persuaded that, even in cultures where there is less emphasis on learner autonomy and data-driven material exploration, this reading model will prove useful because it combines traditional resources – dictionary information – with others that challenge and engage the learner - e.g. bilingualised dictionaries, concordance lines, and multilingual related articles.

2.3.1.1.1.4 Drawbacks and benefits of exposure to authentic materials

The list of arguments against exposing learners to numerous textual resources in order to help them acquire L3 vocabulary is very short and deals mainly with the issue of the speed of acquisition. Hunt and Beglar believe that 'extensive reading cannot be expected to result in dramatic increases in vocabulary growth over short periods of time' (2005). Yet this statement is likely to be inaccurate mainly because it is based on traditional approaches to reading and material-creation for reading. On the one hand, they support the idea that 'new lexis may be quickly forgotten unless reinforced through review or large amounts of additional reading' (ibid.), but they fail to identify the potential of combining traditional methods with the latest corpus-based NLP techniques. M3RM, however, merges the best of tradition and NLP, and addresses the issues raised by these specialists.

A much larger body of researchers supports the idea of exposing students to textual resources so that they can acquire new vocabulary (Gamper & Knapp, 2001a; Grabe & Stoller, 2002; Schmitt & Celce-Muria, 2002; Hunt & Beglar, 2005). Abstract vocabulary, in particular, which is inherently more difficult to acquire, 'can be made more memorable when it is placed in concrete contexts' (Hunt & Beglar, 2005). They also point out that – as already outlined in section 2.2 - an increased L2/L3 vocabulary is only one of the positive outcomes of working with more textual resources: '[w]ell-elaborated semantic knowledge, which includes developing knowledge of usage, collocations and other lexico-grammatical characteristics, is primarily gained through meeting words in context rather than through explicit instruction' (Hunt & Beglar, 2005). Yet developing this type of knowledge is rather difficult when learners have few first-hand encounters with the target language. The solution is represented by significant exposure to motivating materials:

> 'Language learners in countries where the target language is not widely spoken often lack opportunities for the rich

language exposure that is essential for developing the ability to recognise patterns. Extensive reading (Nation, 1997; Susser & Robb, 1990) is believed to facilitate language learning, because it exposes learners to real language use in context, and in amounts far larger than the short texts and dialogues usually preferred for the presentation of new language items. Extensive reading is also regarded as an effective way to help language learners develop intuitions as native speakers do (Krashen, 2004).' (Gabrielatos, 2005)

However, although agreeing in principle with this approach, several researchers also outline specific aspects that can ultimately make the difference between ineffective CALL applications – too many already – and effective ones. Referring to children, McGuiness states that the frequency of exposure to new words is beneficial only if coupled with instruction so that learners gain a better understanding of what a word means (McGuinness, 2004:223). Although the results obtained by studying children are likely to differ significantly from the performance of adults, no such warnings should be ignored and novel reading models should observe them, too. Consequently, my approach combines the presentation of frequency information together with as many authentic concordances as the corpora support, with multilingual dictionary-type information and related word information, so that learners have all the necessary resources to integrate newly-acquired L2/L3 vocabulary into growing semantic maps, leading to a more solid L2/L3 acquisition.

Rodrigo, Krashen and many more also believe that vocabulary is learnt from input, provided this input is *comprehensible* (Krashen, 1980:170; Rodrigo et al., 2004). Traditionally, this would mean in practice that the student know between 95% and 98% of the words appearing in the text.

I argue that a lower rate of L3 knowledge, yet supported by extensive contextual and linguistic information, can still both result in accurate comprehension and L3 vocabulary and grammar acquisition. My reading model and CALL environment are novel and need more testing before drawing more conclusions, but the initial evaluation experiment had encouraging results.

Finally, extensive exposure to reading materials has sometimes been reported to lead to a higher rate of incidental vocabulary acquisition in digital environments than in traditional ones, but more research needs to go into this area, too (Gamper & Knapp, 2001b). Current research points out that, due to its increased relevance for the readers, the volume of incidental vocabulary acquired exceeds the amount of

words taught explicitly (Nation & Meara, 2002:39; McGuinness, 2004:216-217; Hunt & Beglar, 2005).

2.3.1.1.2 Acquiring L3 grammar

Vocabulary and grammar are undoubtedly important components of training to become a proficient reader. Yet the survey of how current approaches to L2 and L3 learning deal with this issue reveals a controversy over whether students should just learn vocabulary and ignore grammar. To my knowledge, though, the majority of CALL environments support the explicit instruction of both grammar and vocabulary. This discrepancy between theory and practice can be explained, on the one hand, by the lack of communication between computer specialists and language tutors and, on the other hand, by the commercial aspect of CALL material production which does not favour deviation from proven traditional practices.

Grammar and lexis have always been regarded as being very closely related, and even 'interdependent' (DeCarrico & Larsen-Freeman, 2002:26): 'one of the most interesting developments in applied linguistics [...] is the realization that vocabulary and grammar are not necessarily separate things, but may be viewed as two element of a single system referred to as "lexicogrammar"' (Halliday in Schmitt & Celce-Muria, 2002:12). In fact, they are so related that the phenomenon of *lexical phrases* occurs. These are 'multi-word lexical phenomena that exist somewhere between the traditional poles of lexicon and syntax, conventionalised form/function composites that occur more frequently and have more idiomatically determined meaning than language that is put together each time' (Nattinger and DeCarrico in DeCarrico & Larsen-Freeman, 2002:27).

Yet not many CALL applications to date support the acquisition of such phrases. Moreover, NLP techniques such as POS tagging and lemmatisation are not implemented in vocabulary-learning applications, thus preventing students from having more relevant information at hand. Another demonstration that the current approach to creating CALL teaching content is limited is the fact that, although studies indicate that L2 structures are acquired more effectively when compared to L1 structures (Saxena & Borin, 2002), their results have not been implemented.

TREAT, nevertheless, provides varied resources catering for the acquisition of both L3 vocabulary and grammar. Its concordance lines build on NLP annotations in order to display POS information for the three language corpora. Exposing learners to multilingual concordances represents a creative way of addressing a concern raised by specialists, namely that it is more difficult to learn grammar from concordance lines (Gaskell & Cobb, 2004). The multilingual concordance lines returned by the TREAT query tool allow users easy access to POS and lemma

information, as well as collocational structures that can be analysed comparatively across up to three languages.

Research indicates that grammar is not acquired in a linear fashion, meaning that one structure is not necessarily mastered after another (Krashen, 1980:169; DeCarrico & Larsen-Freeman, 2002:28). Consequently, M3RM argues for an extensible range of resources and authentic materials that nurture individual exploration and acquisition of elements that are relevant to the user. The debate over whether grammar is indeed best learnt subconsciously, while students try to understand the meaning of the target text (Krashen and Terrell in Leffa, 1992; DeCarrico & Larsen-Freeman, 2002:28; Schmitt & Celce-Muria, 2002:10), or whether it is in fact *not* learnt automatically from the comprehension of input (Gaskell & Cobb, 2004) is not over yet. My approach has been to reach a compromise by assisting providing students in making valid hypotheses regarding the L3 grammar. The results of the evaluation experiment indicate success.

I have been inspired by the ideas behind the *generative grammar*, whose main principles are hypothesis formation and testing, and I support the 'associative learning' approach proposed by Ellis,

> in which repeated exposure to target language forms contributes to the strengthening of connections in neural network models. The models stimulate rule-like grammatical behaviour even though no rules or algorithms are used in constructing the model. Instead, patterns are abstracted from the way structures are statistically distributed in massive amounts of input data (in DeCarrico & Larsen-Freeman, 2002:29).

Other research also indicates that, unlike natives, who rely on their intuition more than on corpus evidence, foreign language learners 'adopt a data-driven approach, i.e. form hypotheses, search for contexts and test hypotheses' (Sripicharn, 2004:242). Using M3RM and TREAT may require users to adapt their current learning styles. Not all language learners are comfortable exploring materials and formulating hypotheses without the strict supervision of the teacher. Nevertheless, the immediate benefits of doing so – e.g. the ability to acquire lexical and grammatical structures not covered by traditional textbooks, as well as understand and translate genuine target language texts in a short timeframe – can make this transition faster and easier.

I also support the creation of corpus-based curricula that are data-driven and not abstract (Gaskell & Cobb, 2004) and I believe the 'spiral syllabus' (Ellis in

DeCarrico & Larsen-Freeman, 2002:32) which caters for recycling previously-learnt structures is ideal. In an authentic, multilingual, corpus-based environment, the creation of teaching materials for such a syllabus becomes much easier and accurate than in traditional settings. Furthermore, it is also believed to have advantages over the 'traditional grammatical syllabus that sequences structures one after the other [, as this traditional model is likely to result] [...] in a mis-match between learnability and teachability.' (Pienemann in DeCarrico & Larsen-Freeman, 2002:32)

M3RM was designed to support the acquisition of syntactic parsing skills in the L3 and also to improve such skills with regard to the learners' L2, as well. *Syntactic parsing* has been reported as being very useful for disambiguating 'the meanings of words that have multiple meanings out of context' provided the ability to process input rapidly and automatically is mastered (Grabe & Stoller, 2002:22-23). Moreover, Van Parreren states that '[a]cting on the syntactic level for instance seems to be possible only if, firstly, the pupil is able to grammatically analyse and to parse sentences and, secondly, he is acquainted with the most frequent syntactic patterns in the target language' (Van Parreren & Schouten-van Parreren, 1981). TREAT enables users to query the language corpora and identify – as well as disambiguate – language patterns. Its design was informed by the suggestion that, instead of complex explicit grammar instruction, language courses should provide extensive reading materials (Grabe & Stoller, 2002:23), and has been extended to support additional NLP tools which offer even further assistance.

When it comes to *morphology*, it is occasionally argued that the current understanding of its acquisition is still insufficient: '[a]lthough a number of descriptive studies have been conducted on English morphology, empirically, little is known about their acquisitional processes, effective instructional methods, and the timing of instruction' (Hunt & Beglar, 2005). The same authors also suggest that inflectional suffixes should be introduced earlier than derivatives, because the latter can cause significant confusion, a suggestion which was taken into account when formulating tasks for the participants in the evaluation experiment.

Moreover, it also seems that the few studies that have been conducted so far have led numerous researchers to believe that morphology is a difficult feature of the L2/L3 to acquire (Barrière & Duquette, 2002; Ward, 2004; DeKeyser, 2005). DeKeyser references several studies highlighting that morphology is more difficult to acquire than syntax (DeKeyser, 2005), and points out that '[m]orphology is [...] shakily represented in learners' intuitions, even after many years of exposure to the L2' (ibid.).

> The research on processing instruction has showed that students benefit from intensive training in paying attention

> to elements of morphology for comprehension, because without such practice they tend to gloss over the morphology (especially students of a morphology-poor language like English acquiring a relatively morphology-rich language like Spanish). The interpretation of various aspects of the processing-instruction literature has been controversial (see, e.g., DeKeyser, Salaberry, Robinson, & Harrington, 2002; VanPatten & Wong, 2002). But nobody doubts that L2 students need to have their attention drawn to morphology while processing input, because otherwise they tend to ignore the morphological cues to sentence meaning. (DeKeyser, 2005)

Lightbown and Spada also point out that beginners 'will probably pay attention to the main words in a message and not be able to also notice the grammatical morphemes which are attached to some of those words' (Lightbown & Spada, 2001:41), hence the need to find an effective mechanism to redirect their attention in order to notice the L3 morphology. M3RM puts forward a possible solution to this problem: the word query results that users get contain numerous morphological pointers. They can be implemented in a variety of ways depending on the technical skills of the designer, but I have learnt from experience that even with minimum skill, a pedagogically-sound CALL environment can be created. The project corpora provide numerous authentic contexts for target words. Each token in each concordance line that users see is POS-tagged, and the tags appear when hovering with the mouse over the words. Lemma information is also used to make learners aware of the different realisations of the same lemma in the current corpus.

Last, but not least, in this project, working with an unknown L3 is assisted by previous knowledge of a related L2. Research indicates that students with a Romance language as their L1 'tend to pay greater attention to the ends of words because there is much more grammatical information in the suffixes of their L1s than in English' (Grabe & Stoller, 2002:47). By analogy, since the L2 and L3 are cognate, even if the L3 were completely different from the learner's L1, the contact he/she had had with the L2 could provide sufficient linguistic knowledge to enable a fast familiarisation with how the L3 works in the context of the varied resources provided by M3RM.

2.3.1.2 Background knowledge

Some researchers do not necessarily treat background knowledge in relation to the other two components – foreign language proficiency and metacognitive strategies - but argue nevertheless that the more one knows about the world, the

easier it is to comprehend a text (Hammadou, 2000; Grabe & Stoller, 2002:12; Flowerdew, 2003; Ariew & Ercetin, 2004) because he/she can understand inter-textual references, presuppositions and implicatures, and is also able to mirror some of the high-level processes involved in L1 reading. 'While background knowledge may be needed to understand individual sentences, it is most often required to understand the relation between sentences near one another in the text.' (Barrière & Duquette, 2002)

Moreover, background knowledge is also thought to be used extensively by learners in order to compensate for a reduced L3 vocabulary (Chun & Plass, 1997). Finally, due to the lack of references to relevant research, the EU point of view on this issue seems to be based on common sense and individual experience more than anything else: '[n]othing is more difficult than a document on a topic you know nothing about, so that you do not know even what you are trying to understand' (CoE, 2001).

It seems that the key to the development of rapid and effective reading skills is exposure to texts on familiar topics written using an *easy* vocabulary. As the vagueness of this statement already indicates, it is rather difficult to identify such texts. A widespread approach is to devise *easy* artificial sentences in the target language, or rewrite authentic ones, simplifying the grammar and vocabulary. However, '[r]esearch by Strother and Ulijn (1987) show that lexical rewriting can increase reading comprehension in English as a second language used in science and technology education, but that no such benefits can be accomplished by simplifying the syntax' (Nilsson & Borin, 2002). Consequently, an ideal approach seems to be to provide students with increased opportunities to expand their background knowledge relevant to the texts they read, as well as give them constant access to authentic language. Evidence from relevant research supports this stand:

> Perhaps one of the most interesting and well-documented findings [of investigations of both L1 and L2 reading research] has been the significant role that cultural background knowledge plays in comprehension. Johnson (1981) gave Iranian and American readers and Iranian folktale and an American folktale and determined that cultural background had a greater influence on comprehension than did semantic or syntactical simplification. (Hammadou, 2000)

However, despite the undisputed advantage of having extensive background knowledge when learning to read in a foreign language, there has been no practical implementation of these recommendations. M3RM, on the other hand, offers

learners an alternative to the traditional approach of relying just on dictionaries once their contextual knowledge has been used fully. Thanks to novel algorithms and existing resources, related texts can be identified automatically, thus providing more contextualised and motivating reading materials in a much shorter time.

Another approach to contextualising reading materials and assisting learners in creating semantic maps in order to gain an accurate representation of the target meaning has been to use analogies (Hammadou, 2000). However, comparing ideas or facts in the target document to other ideas or facts proved confusing and difficult for students. M3RM does not accommodate this approach because of the greater benefit of having multilingual related texts: the learners remain within the same sphere of meaning, have opportunities to see relevant vocabulary used in different authentic contexts, and can build their background knowledge in the L1 and L2 before tackling the L3 text(s).

2.3.1.3 Metacognitive strategies

One of the main goals of education, regardless of the level at which it takes place, should be to create autonomous learners. Contrary to what some believe, this will not represent the end of teaching, just like the fact that leaving school or university should not represent the end of learning, either. In order to become autonomous, students need to become aware of the importance of metacognitive knowledge: they need to get used to evaluating themselves continuously, to acquiring new strategies relevant to particular areas of interest and to using and combining them with other strategies in order to achieve the best result in the shortest time with minimum effort. Although it acknowledges the importance of possessing 'metacognitive abilities' in general, the research world is still debating whether bilinguals have an advantage over monolinguals in this respect (Bialystok, 2001:135).

When it comes to learning to read in an L3, in particular, students need to automatise processes such as identifying salient words and negotiating meaning in order to become autonomous:

> as learners adopt such techniques as attending to lexis that is made salient (whether by the teacher or from glosses), using vocabulary cards and negotiating vocabulary meaning, they can become more autonomous and can actively take charge of enlarging their vocabulary. Ultimately, it is the learners who are responsible for implementing techniques presented by teachers, regularly

> reviewing target lexis, and monitoring their own learning.
> (Hunt & Beglar, 2005)

'Satisfying or satisfactory reading does not just depend on the range of texts available to a particular age group, but on readers, contexts and communities' (Grainger, 2004:255), therefore any novel reading model needs to be equally motivating and supportive for all target audiences.

A small-scale experiment on whether the target audience would be able to adapt easily to M3RM was conducted at the end of the project. One of my hypotheses is that a trilingual, interactive, corpus-based environment where readers can follow their own chosen paths will be more effective than traditional reading instruction methods which involve non-authentic texts in non-authentic settings controlled by language teachers. However, in order to adapt to M3RM, learners needed to be autonomous to a significant extent. The results of the experiment together with informal feedback sessions indicate that, as they used TREAT more, the participants became more proficient at employing 'executive control processes' (Grabe & Stoller, 2002:20).

Like in the case of many other concepts regarding language learning, *learner autonomy* is perceived as 'elusive, particularly in relation to language learning and teaching' (Hurd, 2005). Holec defines learner autonomy as "the ability to take charge of one's own learning" (Holec in Ding, 2005), but the concept is much more complex. Hurd, for instance, presents a far fuller picture, with references to contrasting views that are still under scrutiny:

> First, there are questions to do with definition, degree and application. Is [autonomy] the "ability to have and to hold the responsibility for all the decisions concerning all aspects of this learning" (Holce, 1981:3) or is it a "capacity for detachment, critical reflection, decision-making, and independent action" (Little, 1991:4)? Is it an attribute that signifies "organic independence" (OED online) or does it also imply interdependence? Does it entail complete freedom and responsibility on the part of the learners, or does it come with constraints? Is it something that can be taught, or even imposed on learners, or is it a "contradiction in educational terms" (Holec, 1985:169)? Is it a precondition of successful learning or an outcome of certain modes of learning, for example self-instruction?

> [...] Collaboration with others through sharing the insights of reflection can enhance knowledge and lead to deeper understanding. Little (1996:211), in line with Vygotskian thinking, also claims that "the development of a capacity for reflection and analysis [...] depends on the internalization of a capacity to participate fully and critically in social interactions". (Hurd, 2005:1-3)

The conclusion Hurd reaches is that autonomy is in fact a trainable competence. She also argues that, unless students are already trained to be autonomous, no amount of resources 'will foster in them that capacity for active involvement and conscious choice, although it may appear to do so.' (ibid.:4) Furthermore, while acknowledging the social aspect of learning, she stresses that *reflection* is just as important for cognitive development. Finally, she quotes White's argument that learning in a self-instruction environment does not necessarily imply becoming autonomous; autonomy is a possible, but by not means necessary, result of working in such an environment. The same idea of *reflection on one's own progress* also appears in one of the current descriptions of the elements involved in reading, namely among the 'executive control processes', which are high-level processes that are activated by all readers (Grabe & Stoller, 2002:20). It is therefore justifiable to expect good L1 readers with some knowledge of an L2 to be autonomous, to have active self-monitoring skills, and thus make the most of a reading model such as M3RM.

Being autonomous also implies being able to integrate new with already acquired information into more complex and accurate models of representation, rather than follow instructions and have foreseeable reactions to explicit teaching: 'successful learners are seen increasingly as those who can construct knowledge directly from experience of the world, rather than those who respond well to instruction' (Benson in Murphy, 2005:20).

Under these circumstances, it is evident that CALL applications and other forms of self-learning environments should not be built without a thorough study of the latest findings of language teaching and learning specialists. Throughout my research, I have aimed to incorporate the current best practice in a variety of fields related to TLA, NLP and CALL into M3RM. Moreover, my reading model seeks to accommodate what Garrido calls 'Leo van Lier's "triple A" approach to curriculum design', which introduces the concepts of '*Awareness, Autonomy, Authenticity.*' (Garrido, 2005:184).

> *Awareness* relates to being able to perceive the need to learn something, focus on it and subsequently apply

previous knowledge and experience to acquire new knowledge. *Autonomy* has to do with choice and responsibility. Learners can only succeed if they have control, ownership, choice, competence to do the work and the ability to assess their progress. *Authenticity* refers not only to the language input to which students are exposed, but also to the realism of the situations in which they are expected to perform as part of the learning process (van Lier, 1996:5-13) (ibid.:184-185).

As demonstrated by the evaluation of TREAT, M3RM allows students to work at their own pace, use the resources according to their preferences, as well as make hypotheses about the workings of the L3 and check their validity in order to both learn more and notice the progress they are making.

Leffa puts forward two conditions that reading courses need to meet in order to make texts accessible to beginning foreign language readers. Out of the two, the second one is said to be less obvious for many tutors and designers: 'support to the student should be given only when necessary, interfering as little as possible with the reading process of the original text' (Leffa, 1992). M3RM observes this recommendation by building on a significant number of relevant textual and linguistic resources without forcing the learner along any pre-defined path. However, when assistance is requested by the learner in the form of lexical queries, response time is low and results are relevant. Thus, M3RM fully allows students to 'work on individual computers truly at their own pace' (Schmitt & Celce-Muria, 2002:8-9).

Another criterion which resources need to meet in order to be useful for beginning L3 readers and foster autonomy is that they should be organised according to some sensible criteria. In White's words, attention needs to be paid to 'the content and conversational character of course materials as a means of fostering learner independence'. Regarding this aspect, she presents Holmberg's argument, who believes that '*guided pedagogic conversation* can be fostered by well-developed self-instructional materials; it is the responsibility of the course developer to create a simulated conversation with the learner through the materials.' (White, 2005:57). By allowing complete freedom for users to consult the project resources, and making it easy to increase the textual materials, as well as by giving learners the opportunity to select texts according to valid criteria such as text and sentence length, lexical density, and predominance of a certain part of speech, M3RM accommodates and supports the learners' interests.

2.3.2 Reading as a learning process

Reading is generally viewed by specialists as a learning process: '[o]ne outcome of reading being a purposeful and comprehending process is that it is also a *learning* process.' (Grabe & Stoller, 2002:19). It was therefore natural to find out more about the types of learning activities that have been identified so far, as well as the elements that are learnt through reading.

First of all, the term *learning,* comprises *explicit learning,* as well as *implicit learning*. By contrast with *explicit instruction*, which involves interaction with a tutor, *explicit learning* has been defined in the SLA research world as 'conscious searching, building and testing of hypotheses and assimilating a rule following explicit instruction' (Hunt & Beglar, 2005). At the moment there is significant debate over the roles that implicit and explicit learning should play in the acquisition of a second or third language and, just like in the case of the debate over the choice between using a top-down approach or a bottom-up one, the latest development is to argue for a combined approach which states that both alternatives should be used, but which remains vague about the extent to which they should be used: '[a]lthough longitudinal studies that track vocabulary growth are lacking (see Schmitt, 1998 for an exception), I hypothesize that reading large amounts of text combined with explicit study results in the most efficient means for expanding vocabulary breadth over the long term' (Hunt & Beglar, 2005).

The SLA research community does not dispute that for *learning* to take place effectively, students need to *practice*. In fact, language acquisition specialists are demanding that more reading resources be made available to learners and that more time be allocated by language curricula in order to work with these resources. Hunt and Beglar also argue for the provision of enough opportunities for students to recycle the knowledge they acquire, as well as to consider lexical items in the more general context of the particular language they are looking at: 'words become meaningful because of their relation to other words' (Kintsch in Hunt & Beglar, 2005). I favour the more comprehensive argument that words become meaningful when seen several time in relation to other words, preferably in authentic contexts, either through *condensed reading* or within the implementation of a more complex model such as M3RM.

However, learning to read in L1, as well as L2 or any subsequent languages, does not consist only of learning words. Lexis is viewed very often as the most important area one needs to master in order to become a successful reader, but one should not overlook other important complementary aspects – some of which are also mentioned by Grabe and Stoller as desirable reading strategies that should become automatised (see section 2.3.1):

the view of reading from a so-called "reading components" perspective proposes to subdivide reading into six general component skills and knowledge areas (as summarized by Grabe, 1991):

(a) automatic recognition skills;

(b) vocabulary and structural knowledge;

(c) formal discourse structure knowledge;

(d) content/world background knowledge;

(e) synthesis and evaluation skills/strategies;

(f) metacognitive knowledge and skills monitoring.

(Chun & Plass, 1997)

More research is needed in order to identify the best practices that support a fast and easy transition from learning-to-read to reading-to-learn. At the moment, researchers indicate that 'there is little exploration in L2 reading research of the transition from learning-to-read to academic reading-to-learn, yet this transition is expected to occur in many L2 contexts.' (Grabe & Stoller, 2002:85). Users of M3RM are expected to make this transition very quickly so that they can both translate accurately from the L3 into their L1, and be able to acquire multilingual information in order to expand their background knowledge.

Grabe and Stoller present a number of instructional practices that can prove beneficial in reaching the reading-to-learn stage, most of which are supported by M3RM: 'practicing effective summarising strategies; using graphic representations for organising text information; identifying key vocabulary and learning these words; combining information from multiple sources; recognising types of evidence in texts; recognising levels of informational importance signalled in texts' (Grabe & Stoller, 2002:86).

2.3.3 Reading as an interactive process

I hypothesise that by interacting with enough relevant resources, learners will be able to become good readers without explicit instruction from teachers. The benefits of interaction have already been acknowledged by specialists: '[s]econd language acquisition (SLA) theory suggests that learners need to interact with the target language to acquire it (Larsen-Freeman and Long, 1991; Pica, 1994, Chapelle, 1998)' (Hegelheimer & Tower, 2004). However, the term *interaction* implies several aspects: on the one hand, it refers to the contact between the learner and the resources, the choices made, the paths followed; on the other hand, it also refers to

the relations between the many components that make reading such a complex process. Familiarity with the many facets of this interaction is needed when designing an effective L3 reading acquisition methodology.

Spector–Cohen summarises in a clear manner what a long line of researchers have been stating for some time about the interactive aspect of reading:

> A significant body of literature posits that reading is an interactive process (Carrell, Devine, & Eskey 1988; Grabe, 1988, 1991; Rumelhart, 1977; Stanovich, 1980;, inter alia). According to Grabe (1988, p. 56), the notion of reading as an interactive process refers to "a kind of dialogue between the reader and the text". The notion of reading as an interactive process evolved from schema theory and is often termed the top-down approach to reading. Carrell (1983) distinguishes between formal schemata - the reader's knowledge of formal, rhetorical structures of texts - and content schemata previous knowledge which the reader possesses. In addition to his notion of reading as an interactive process, Grabe (1988) posits an interactive model of reading. The term usually refers to the interplay of both bottom-up (lower-level) and top-down (higher-level) reading strategies (Block, 1992; Eskey, 1988; Rumelhart, 1977). Bottom-up strategies include decoding graphic features and grammatical characteristics, while top-down strategies include predicting, applying background knowledge and recognizing global text structure. The notion of top-down strategies is usually used in the literature to include both global strategies for processing the text as well as activating conceptual (background) knowledge of the world (Carrell, 1985, 1988; Rumelhart, 1980; Shih, 1992). (Spector-Cohen et al., 2001).

This argument embodies one of the most fascinating and challenging aspects about reading in a second or third language, and also explains to some extent the failures that have been often noticed in the field of CALL. The *dialogue* between the reader and the text involves decoding that particular piece of writing and approaching it as a homogenous whole with an overall meaning, rather than as a sequence of separate sections – even sentences. However, research indicates that, while L1 readers tend to approach texts mostly from this perspective, L2 and L3 learners are more prone to adopt the bottom-up approach – even though they may

not be aware of it. Practically, they tend to spend much more time at the word level, identifying tokens, trying to work out unknown lexical items and looking up endless phrases and structures in their dictionaries, often resulting in the loss of the overall meaning of the text: '[w]hen a reader slowly analyses a word into component sounds and blends them, a great deal of capacity is consumed, with relatively little left over for comprehension of the word, let alone understanding the overall meaning of the sentence containing the word and paragraph containing the sentence.' (Pressley in Grabe & Stoller, 2002:21).

The remedy for this bottleneck is the development of automatic word recognition skills, which '[consume] very little capacity, and thus, [free] short-term capacity for the task of comprehending the word and integrating the meaning of the word with the overall meaning of the sentence, paragraph and text' (Pressley in Grabe & Stoller, 2002:21). Nevertheless, no skill is isolated when it comes to reading. Knowledge of morphology and word-formation processes can be as important as – and very often they prove even more important than - knowing a large number of words in the target language (Van Parreren & Schouten-van Parreren, 1981).

To date, no available CALL applications are scalable enough, nor do they provide adequate lexical, grammatical and textual resources. Consequently, the development of word recognition skills is heavily impaired, because they are

> difficult to develop without exposure to print [...]. In L2 reading contexts, much less discussion is devoted to this topic. This avoidance is partly due to a limited understanding of the role of rapid word recognition processes in reading. It is also due to the tremendous difficulties involved in providing L2 students with the time, resources and practice needed to develop a very large recognition vocabulary. (Grabe & Stoller, 2002, p. 21)

With only very few authentic texts at hand, students have far less opportunities to activate passive linguistic knowledge, develop automatisms for recognising words and expand their background knowledge, which are all important components of the *interactive models of reading* - the metaphor that Grabe and Stoller consider to be the ideal compromise between the various approaches to reading. This ideal is nevertheless an utopian one, because certain aspects of the bottom-up approach are incompatible with others from the top-down one – e.g. automatic processing of words cannot be performed as quickly as expected if the reader is to stop and disambiguate the meaning of words, integrate the new information with his/her

already existing background one, and make inferences or predictions about what information will come next in the text (Grabe & Stoller, 2002, p. 31).

At the same time, apart from the cognitive aspects, there is also a physical interaction between readers and texts. Kol and Schcolnik claim that '[t]he process of text comprehension involves the reader in a complex, dynamic, ongoing interaction with the text. This interaction often involves some kind of text manipulation such as highlighting or annotating. [...] Text manipulation, whether on screen or on paper, "externalises the otherwise invisible reader interaction" (Cobb & Stevens, 1996)' (Kol & Schcolnik, 2000). This feature was more difficult to implement in TREAT and may be the subject of future work.

3 Computers and language learning

Tomoda does 'not see CALL replacing face-to-face teaching' (Tomoda, 2005) in the complex scenario of language learning. I do not dispute the significant role of teachers, yet I argue that, as long as both language tutors and CALL designers continue to ignore SLA/TLA and NLP research, CALL will not progress a great deal, while the teacher's role is unlikely to change from the demanding and labour-intensive one of *instructor* to the more creative and rewarding one of *facilitator*. It is surprising that, although the field of NLP is constantly evolving, the only functionality used by the very few tutors that 'are [both] clear about the nature of corpora, or their significance for language teaching [, and] have [...] made direct use of a corpus' (Gabrielatos, 2005) is the ability to provide contexts for target words or structures.

Hegelheimer and Tower (2004) argue that '[r]esearch in Computer-Assisted Language Learning (CALL) has shifted from investigating if CALL is superior to non-CALL to how CALL can be used effectively in language learning', yet Colpaert goes against this stand, as well as Chapelle's suggestion to no longer preach to the converted (Chapelle, 2003:176-177), and states the opposite: 'the efficacy of online language learning compared to classroom learning or distance learning remains generally underinvestigated' (Colpaert, 2004a:51). It is therefore evident that, rather than debate, what my field of interest lacks is conclusive studies investigating how CALL software built on sound NLP, CL and SLA/TLA research is used in authentic settings rather than in researchers' laboratories (Chapelle in Hegelheimer & Tower, 2004). M3RM, together with its practical implementation, TREAT, address this very issue.

Specialists have identified an apparent lack of emphasis on recent advances in technology, which is not alarming because the current priority should be to strike the right balance between pedagogy and technology for language learning. Colpaert, for instance, is surprised that all the latest gadgets and technological advances have been largely ignored so far:

> By the end of 2004, the Internet hype has faded away, but we are swamped with new devices and new technologies which can be expected to revolutionize language learning and teaching: We are entering the mobile era. Cellular or mobile phones with multimedia communication capabilities, and handheld devices that function more and more like wireless laptops have become common tools.

> After what has been written about the affordances of the Internet, I was expecting another tidal wave of articles promoting new language learning methods based on the advantages of mobile technologies and creating exaggerated expectations. Nothing of the kind.
>
> New technologies such as WAP (Wireless Application Protocol), PDA (Personal Digital Assistants), WML (Wireless Markup Language), GPRS (General Packet Radio Service), UMTS (Universal Mobile Telecommunications System), and I-mode (mobile Internet access) lead to new ways of communication. (Colpaert, 2004b)

Nevertheless, given the existing issues that are constantly raised regarding the inappropriateness of CALL applications – see section 3.3 for more details on the drawbacks, as well as advantages, of using hypermedia for language learning - establishing a set of best practices and evaluation criteria should come before implementing the existing courseware on new gadgets, as it is quite unlikely that new technologies will solve old instructional dilemmas.

3.1 Should one think twice before using computers for teaching languages?

There is evidence to suggest that computers have not been used appropriately in the language-learning process, and even that computers are not helpful at all. Rouse points out that the current trend to 'go digital' (Kol & Schcolnik, 2000) is not justified by the latest research: '[a]lthough schools across the country are investing heavily in computers in the classroom, there is surprisingly little evidence that they actually improve student achievement' (Rouse & Krueger, 2004). Such investments appear therefore more as marketing tools to attract students, rather than necessary means to deliver high-standard language instruction, since '[a]vailable evidence on whether computers actually make a difference for students is quite small and the results are mixed (see Angrist & Lavy, 2002; Boozer, Krueger, & Wolkon, 1992; Goolsbee & Guryan, 2002; Kirkpatrick & Cuban, 1998; Wenglinsky, 1998)' (ibid.:325).

SLA and TLA specialists identify shortcomings on several levels regarding employing advanced technology for language learning. The most important one is connected to the fact that computers are often used without a clear and well-grounded pedagogical motivation (Richmond in Felix, 1997; Barrière & Duquette,

2002; Colpaert, 2004a:69). Not everyone seems to have understood that 'the technology itself does not bring about improvements in learning' (Kern and Warschauer in Yeh & Lo, 2005) and '[t]he use of technology in learning environments has tended to be technology-led rather than theory-led' (Ravenscroft in White, 2005). Despite the fact that the computer hype has led to the production and distribution of numerous CALL applications, most of these are of questionable quality and have often disillusioned teachers and students alike (Richmond in Colpaert, 2004a:69). Barrière comments: '[i]n fact, the majority of tools available are not based on any specific discernable learning paradigm. Chapelle (1997) is of the opinion that many if not most designers work in the absence of principles derived from theory' (Barrière & Duquette, 2002), while Plass takes the same idea further: '[i]nstructional multimedia software and online materials with multimedia elements enjoy increasing popularity on all levels of education. Our theoretical understanding of the processes of multimedia learning, however, lags behind' (Plass et al., 2003). Overall, it all seems to be happening because of a serious breakdown in communication:

> Natural Language Processing [...] which deals precisely with the use of (natural) language by computers - ought to be eagerly brought to bear on the task of developing Computer-Assisted Language Learning (CALL) applications by CALL practitioners.
>
> Similarly, NLP researchers ought to be interested in (human) first and second language learning, and in developing NLP systems in support of language development and learning.
>
> Unfortunately, neither is actually the case. (Borin, 2002)

Moreover, the evaluation of CALL applications has often been of a descriptive nature – pointing out what the programmes *can* do – rather than a critical one – taking into account the soundness of their pedagogical foundation, as well as how effectively they perform the tasks their producers advertise -: 'these educational products are often controversial and rarely evaluated using rigorous analytical methods' (Rouse & Krueger, 2004).

The solution is obvious and hardly utopian: mutual interest and support from all players involved in language teaching nowadays. 'The soundest programs should be those that are state-of-the-art but produced by a team of programmers and language educators in partnership' (Felix, 1997), their pedagogical foundations

should be checked carefully, and their integration with other teaching resources within existing curricula should be well-researched, too.

The latest trend is to argue for and attempt to implement the dynamism of a CD-ROM-based educational application in a web-based environment. The result is often very similar: be it on an independent machine or on-line, the large amount of information – presented as linked written passages, as well as audio and video files – that the users are exposed to leads to 'cognitive overload' (Yeh & Lo, 2005). Although numerous researchers welcome web-based lessons as giving learners the opportunity to 'take control of their learning' (Ding, 2005:46), one should also be aware that, at the moment,

> [w]eb-based instruction is not without problems. Brown (1998) pointed out that many hypermedia-based courseware designers construct the knowledge nodes arbitrarily. Since learners have total freedom in browsing the Web course, they fail to grasp the more important information effectively. It is also suggested that some learners could experience disorientation and cognitive overload due to the huge quantity of information presented and its lack of organization (Brown, 1998; Governor, 1999; Marchionini, 1988). The above discussion implies that, in general, the structure of the document and the learning strategies used are two important issues involved in Web-based instruction, and courseware designers need to pay close attention to how World Wide Web (WWW) courseware is constructed in the FL/SL curriculum as well as how learners navigate through it. (Yeh & Lo, 2005)

Another major shortcoming of using computers for language learning is that producing CALL applications usually involves significant time, as well as financial and human resources (Barrière & Duquette, 2002; Tomoda, 2005). Colpaert gives a thorough account of the steps involved in the development of CALL content:

- 'content authoring;
- content structuring;
- content formatting;
- input;
- multicarrier output;
- content testing and debugging;

- updating;
- reusability of content' (Colpaert, 2004a:61)

In particular, regarding the 'content structuring' stage, he shares the opinion of other researchers who argue for using various methods of enhancing input – such as highlighting salient words or presenting the same language feature in several authentic environments (Gamper & Knapp, 2001a; DeCarrico & Larsen-Freeman, 2002:30).

> 'Next to the internal organization of content, there is the need for "enhanced input" (Chapelle 2003, Hwu 2004). According to Chapelle, there are three types of enhancement: input salience, modification and elaboration. Input salience means "marking a grammatical form on the screen or phonologically through stress." Modification stands for "making the input understandable to the learner through any means that gets at the meaning (e.g. images, L1 translation, L2 dictionary definitions, simplification)". Elaboration aims at "increasing the potential for understanding the input through addition of plausible, grammatical L2 elaborations to the original text (e.g., defining relative clauses)" (Chapelle 2003, 40).' (Colpaert, 2004a:61)

His conclusion that '[t]ransforming content into enhanced input for offering the learners the opportunity to acquire features of the linguistic input that they are exposed to, requires an extra effort from content developers' (Colpaert, 2004a:61) is therefore justified, but I also argue that this effort can be significantly reduced if NLP techniques are employed and if applications are designed to cater for smaller components of language learning. I propose an interactive, multilingual, corpus-based model of reading (M3RM) that can be implemented with minimum effort. M3RM is designed to be flexible and extensible, while still preserving its multilingual features, thus solving the issue raised by Colpaert with regard to the expensive mission of updating content:

> Making consequential changes to content (e.g., updating dated cultural content) requires considerable investment of money, time, and effort. Sooner or later, these changes require publishing a new version of the courseware package. Linguistic changes occur more often than most people think. (Colpaert, 2004a:62)

Moreover, while using a variety of relevant materials, M3RM does not rely on complex multimedia annotations because of two reasons: firstly, it is such annotations that involve extensive financial and human resources and limit the amount of authentic materials that can be used coherently in a CALL environment; secondly, as discussed in section 3.3, their benefits for the language learner have not been proven in a conclusive manner. For instance, Baddeley, Chandler & Sweller, Miller, as well as Sweller (in Plass et al., 2003) hypothesise that '[o]ne probable cause for the detrimental effects that were found in some studies is the cognitive load which is imposed on the learner when using multimedia information for learning and the limited processing capacity of the human working memory'.

Nevertheless, more research is needed because multimedia applications do cater for a wider audience – e.g. users preferring either visual resources or verbal ones, or both, - therefore identifying best practices in this area should become a priority for researchers. The question is no longer whether to use a particular type of annotation or not, but how to use it sensibly because, as Yeung et al. (in Plass et al., 2003) report, depending on the learner's expertise, explanatory notes aimed at facilitating text comprehension resulted in low vocabulary acquisition, while explanatory notes aimed at facilitating vocabulary acquisition led to miscomprehension of the target text. Finally, the same study indicates that learners should have the choice between visual and verbal annotations, but should not be forced to process both of them at the same time, as this will increase their cognitive load to a great extent.

Many researchers are put off using CALL applications only because the quality of the feedback given by such tools is not similar to the one they themselves would offer. This attitude is rather unfounded given the complexity of human reasoning and language, yet it would be beneficial if new avenues were explored in order to increase the quality of automatic feedback. Furthermore, CALL applications are still produced without a clear understanding of the target audience. Generic materials are created for vaguely-defined groups while ignoring the fact that, when it comes to reading activities,

> [e]ach reader is a complex entity who comes to the reading task with background knowledge, including experiences in life and in learning, knowledge of L1 and possibly other languages, as well as a personal learning style. These varying characteristics require that CALL tools must adapt to the learner's degree of competence in L2, learning style, and preferred navigational path. (Barrière & Duquette, 2002)

It has also become apparent that users – teachers and students alike - need training before starting to use CALL applications. Even in the case of exercises which researchers rate as *easy* given their "reading for information" nature - such as skimming and scanning: see section 2.1 - research indicates that users who are not experienced computer readers perform below the expected level (Kol & Schcolnik, 2000). There are two possible solutions to this problem: either design and create relatively simple and straight-forward applications – such as TREAT - with lower goals than *achieving immediate proficiency in reading, listening, speaking and writing in a foreign language*, or involve a sufficient number of computer specialists in the production process because '[i]t requires a large amount of complex functionalities to make complex functionality invisible' (Colpaert, 2004a:64).

On the more advanced level of course creation, researchers also point out that specialists who intend to combine NLP and CALL need to be trained to understand these technologies: 'whoever wishes to utilize NLP technologies in CALL applications should ideally be trained to understand the technologies, i.e. trained in Computational Linguistics or the equivalent, as I have not yet advanced to the point where these technologies come pre-packaged for immediate use' (Borin, 2002). Moreover, another criticism that is often raised against the use of computers for language learning is that the technology is not yet at an advanced enough level to identify and adapt to the learner's background (Barrière & Duquette, 2002).

I address the large majority of these issues by proposing a novel reading model and implementing it in a user-friendly and intuitive environment. I combine existing NLP resources and technologies with my own tools in order to provide both students and tutors with effective assistance upon request. I follow Garrido's advice of not 'adopting new technologies just because they might solve logistical difficulties' (Garrido, 2005:192). Far too many current studies reduce CALL to chat-rooms and downloadable materials instead of exploring the best ways of subordinating the technology to sound pedagogical theories. Not targeting specific target audiences also runs the risk of not engaging 'enough students for long enough' (Ding, 2005) because the content is likely to involve 'present[ing] learners with retrograde approaches to learning instead of innovative ways forward' (Garrido, 2005:192).

3.2 Yet computers should still be used for language teaching

Other research highlights the fact that, despite the challenges posed by formulating and observing the ideal mechanism for combining NLP, TLA and CALL, 'teaching and learning will move in the direction of digital modes' (Kol & Schcolnik, 2000). Felix, just like Tomoda (2005) and many others, points out that the use of technology has a strong motivational effect on language learners, because

it can provide '[f]ocussed reinforcement of items learnt in the classroom, instant feedback on ability, and unlimited private access to teaching materials in a non-threatening environment' (Felix, 1997). Under these circumstances, '[c]reative and flexible use of technology seem to be what is needed in a profession in which the practices and issues are becoming increasingly complex' (Chapelle, 2003:31).

Moreover, although it appears that this drive to use more of what computers have to offer for language instruction is at present more often than not technology-based, it is nevertheless a fact that e-learning and virtual learning environments (VLEs) are becoming more and more popular with decision-makers. For instance, the EU has set up the eTen programme (EU, 2004) which is aimed to support projects in a wide range of e-projects:

- on-line governmental services ('e-government');
- on-line health services ('e-health');
- encouraging the participation of older people and people with disabilities in the information society ('e-inclusion');
- on-line learning ('e-learning');
- increasing user confidence and the security of the services available;
- facilitating the participation of small and medium-sized enterprises (SMEs) in the e-economy.

This is a response to the recognized need to 'exploit the full potential of new communication and information technologies' (CoE, 2001) which are becoming more accessible and require more attention (Colpaert, 2004b; Yeh & Lo, 2005), and to the fact that, although the EUROBAROMETRE study pointed out the willingness of the majority of respondents to learn new languages, it also showed that '[c]hoosing mobility as a learning tool for updating professional skills in the future attracted only 5% of survey respondents' (Chisholm et al., 2004:49). Therefore, in the absence of sufficient qualified language teachers, effective e-learning environments need to be designed and implemented.

Furthermore, it appears that CALL environments have significant motivational qualities (Leffa, 1992; Felix, 1997; Plass et al., 2003; Yeh & Lo, 2005): such settings are often created with the idea of interaction in mind and '[l]earning through direct experience has, in many contexts, been demonstrated to be more effective and enjoyable than learning through "information communicated as facts"' (Laurel in Felix, 1997; Saxena & Borin, 2002). Students have also reported

preference for working at their own pace and finding new strategies to handle the new computer-based approaches to language teaching:

> learners can take control of their learning (Gordon, 1996) by choosing materials and resources (Herrington and Oliver, 1997), discovering new materials for themselves, ... devising their own ways of handling information, choosing the order in which they tackle activities, and working at their own pace and when they wish to. (Ding, 2005)

CALL environments have also been favoured in numerous language-learning settings because they provide 'paperless supplementary materials and opportunities for out-of-class learning' (Tomoda, 2005).

One criterion for deciding whether CALL truly has a future in language teaching and learning is testing its support for the best practice in SLA/TLA. McGuinness, for instance, lists five key communicative styles to which young learners currently respond well:

> *Guidance style* - provide gentle invitations to play and engage in positive interactions. Avoid prohibitions.
>
> *Symbolic emphasis* - make connections between words and things and other words.
>
> *Feedback tone* - positive feedback is good. negative feedback is bad.
>
> *Language diversity* - use different nouns and adjectives as much as possible.
>
> *Responsiveness* - tune in. follow the child's lead. avoid telling the child what to do (McGuinness, 2004:220)

M3RM has been designed to support these communicative styles, by providing users with materials to suit their interests; resources to make connections between the L1, L2 and L3 systems, as well as disambiguate word senses; varied input; and comprehensive responses to multilingual queries. It is therefore likely that my reading model is more likely to achieve its goals than other CALL methodologies.

The above-mentioned suggestions were also taken into account when designing the technological and e-learning components of my reading model implementation in order to create a coherent whole which builds on the current best practices. I am also arguing for an approach to e-learning which does not view students as mere *subjects* and does not provide them with numerous technology-driven functionalities simply to see how they use them. My view is supported by

research suggesting that, if the underlying principles of the tasks students are required to complete are explained clearly, their performance and level of motivation increase significantly because their intellectual skills are more involved than the mechanistic ones (Saxena & Borin, 2002; Holmberg, 2005).

Despite all the challenges posed by current CALL applications, and since learning languages with the help of technology has already become very popular, one should not dismiss this approach, but rather try to remedy its shortcomings:

> 'language courseware should not be discarded or stigmatized because of its inherent problems. On the contrary, the huge potential in the language market, associated with specific strengths and opportunities, leaves CALL practitioners no choice but to work on a scientific method for solving these problems and, in so doing, continue to improve the effectiveness of CALL in the long run.' (Colpaert, 2004a:77).

3.3 From nuisance to asset: hypermedia annotations

Hypermedia annotations, especially if they involve sound and video, pose a series of problems from a development point of view. First of all, they can be expensive to produce: they require people acting, directing, recording, editing and producing. Secondly, the design stage needs to be extremely thorough because in such cases changing one's mind about a particular element at a later date will require more financial resources, and if the same actors are not available, then the materials will no longer be consistent. Thirdly, if the designers decide to use authentic sound and video materials on top of the textual ones, further copyright issues will need to be dealt with. Fourthly, the size of such annotations is often large, and therefore making them available to big audiences can be problematic.

These four reasons represent the main explanations for the current state of CALL applications in terms of how they are perceived and what materials they contain. Hypermedia constitutes much too often a very important component of the final product, so that the production process slows down and becomes very costly. These factors also put off teaching and language specialists from developing such applications, and since such specialist contributions are only occasionally encouraged during the design stage, many CALL applications try to hide a complete lack of pedagogical theory and practice behind media-rich interfaces. Resources cannot be updated as one progresses through them, and so it can become frustrating

for tutors and students to have to work with the same limited materials over and over again.

However, this state of facts does not worry everyone. Colpaert's main criticism of web-based CALL is primarily linked to its inability to support all the functionalities that stand-alone, CD-ROM applications do, and his opinion is not an isolated one (Colpaert, 2004a:51-61). Yet smaller implementations of complementary language-learning models which only aim to cater for one of the four skills at a time can both be found effective by the learners and use enough of the latest technology.

Any CALL developer should reflect on the true usefulness of hypermedia, the type of processes it stimulates in the user, as well as whether there is a minimum of annotations that has been shown to improve the users' command of the foreign language.

Just like in any other aspect of language teaching and learning, researchers argue both for and against the use of hypermedia in the language classroom. On the one hand, video and sound annotations were not found to help comprehension, and 'a negative relationship was found between the time spent on video and graphics annotations and reading comprehension for the intermediate group' (Ariew & Ercetin, 2004). This study also indicates that background knowledge was a much more significant factor in text comprehension. Furthermore, extensive visual annotations and hyperlinks were found to lead to high cognitive load and even overload, especially in the case of low-ability students (Plass et al., 2003; Yeh & Lo, 2005), while adult learners in particular did not seem to respond well to annotations (Ariew & Ercetin, 2004). Finally, Chun and Plass present examples in which no annotation lead to better results than written annotations without visual ones (Chun & Plass, 1996). However, this last study is not without limitations, as the annotations that it featured mainly involved glosses for the 'more difficult words'.

I argue that by using hypermedia that activates and expands one's background knowledge and provides support for identifying language patterns, as well as establishing meaning, CALL applications are more likely to lead to a solid acquisition of the target language – not to mention that current NLP advances can be brought in to minimise the time, financial and human effort involved in CALL system design and deployment.

Technology-driven applications have been produced for some time. When they first came out, their novelty aspect made them quite popular: 'in facilitating L2 reading comprehension, the use of sound, pictures, and animated pictures or video in addition to text have played an important role in vocabulary acquisition and in

overall text comprehension, and are unquestioned components of instructional materials for language learning' (Chun & Plass, 1997). However, over the last few years researchers made the distinction between the influence of complex hypermedia on the students' attitudes to reading as opposed to their overall performance. It is in the former case that hypermedia has been found to be most helpful.

On the other hand, studies on less complex applications addressing more specific needs have indicated that, if used according to a sound methodology, hypermedia annotations are likely to be perceived as motivating (Gamper & Knapp, 2001a), and consequently improve the learning process. Yeh acknowledges experiments which show that hypermedia is nowadays more available to language learners (Kern & Warschauer, Liu in Yeh & Lo, 2005). Yet, once again, the use of multimedia appears to be motivated by technological developments.

Sound arguments for using hypermedia build on the fact that it provides users with 'an abundance of authentic materials that correspond to their learning needs' (Yeh & Lo, 2005) and that 'the use of hypermedia learning systems has been claimed to promote a higher level of comprehension development because it requires the association and linking of different ideas and information rather than the recall of facts and data' (Paolucci in Yeh & Lo, 2005). More research is yet needed into how to subordinate the available technology to solid pedagogical principles (Lanham in Yeh & Lo, 2005). In designing M3RM, attention was given to the 'plurilingual approach' which, although relatively simplistically defined, hints to the benefits of becoming familiar with culturally-specific, as well as linguistic, phenomena particular to a foreign language.

> [...] the plurilingual approach emphasises the fact that as an individual person's experience of language in its cultural contexts expands, from the language of the home to that of society at large and then to the languages of other peoples (whether learnt at school or college, or by direct experience), he or she does not keep these languages and cultures in strictly separated mental compartments, but rather builds up a communicative competence to which all knowledge and experience of language contributes and in which languages interrelate and interact. (CoE, 2001)

As far as the comprehension aspect is concerned, research indicates that visual, audio and textual annotations help comprehension (Plass et al., 2003; Yeh & Lo, 2005), and particularly that different combinations of annotations have different results: video and textual annotations have been reported to help bottom-up processing (Chun & Plass, 1996; 1997); video, sound and textual annotations were

beneficial for top-down processing (ibid.); and visual and textual annotations together had a better influence than each one of them taken separately (Plass et al., 2003).

Yet M3RM challenges these findings due to the different nature of the annotations it can provide. The M3RM annotations offer both the background knowledge (which video and sound annotations provide in traditional experiments) and multilingual linguistic information (occasionally present in bilingual form, but never as far as I know in trilingual form) that students need for comprehending the target text.

Finally, an encouraging aspect highlighted by researchers is that annotations generally improve the learners' attitudes towards reading from screen (Chun & Plass, 1997; Ariew & Ercetin, 2004; Ding, 2005). This idea, combined with the above-mentioned warning that extensive hypermedia can lead to cognitive overload, proves that hypermedia can indeed represent the future of language teaching provided its design and implementation take into account the latest research into what learners need rather than what the technology can offer.

3.4 Corpora and NLP in language teaching

Despite their recent slowly-growing popularity with language tutors, the use of corpora – 'bod[ies] of machine-readable text' (McEnery & Wilson, 2001:197) - and natural language processing tools – without which the field of corpus linguistics could not exist – in foreign language classes has been hampered by the failure of specialists to distinguish between 'scientifically interesting' and 'pedagogically useful' findings (Kennedy in Aston, 2000:7). While Leech was pointing out that '[a] computer corpus is fast becoming a universal resource for language research' (Leech, 1997a), Collins' prediction that '[f]or those working in any field of language study, language description or language teaching, corpus use will become as natural and vital as it already is for the lexicographer' (Collins, 2000:52) has not become reality for language teachers until now, and in many institutions teachers, as well as students, need to start appreciating the true relevance of using corpora for producing and delivering language teaching materials (Seidlhofer, 2000:207; Gabrielatos, 2005). Overall,

> [c]orpora seem to have entered the classroom from the backdoor. Whilst corpus data have long established themselves as *the real language data* (paraphrasing Cobuild's famous catchphrase), sweeping away resistance as to their descriptive and, more controversially, pedagogic

> value, the actual use of corpora in language learning settings has for a long time remained somehow behind such momentous breakthroughs this now seems less true, however[...]. (Bernardini, 2004:15)

Corpora are seen to provide such valuable data that researchers foresee a bright future for their use, even in the field of language learning. All that needs to be done is an adjustment of traditional practices to incorporate evidence of authentic phenomena from authentic sources so that language learning is made a more relevant - and consequently engaging and rewarding – activity. Language will continue to be ambiguous, incomplete and variable, but corpora are likely to help us keep up with it when teaching it:

> In general from a classroom perspective the emergence of corpora may not seem to be good news - a large amount of new information to absorb, and an unsettling failure to confirm the consensus view of language that has been considered adequate for most classrooms for many years. […] much of the apparent difficulty arises not from corpora but from a poor fit between the models we use and the data that corpora uniquely provide; many of the problems just dissolve when the theoretical adjustments are made. In the long run it is unlikely that corpus evidence can just be ignored […] (Sinclair, 2004:271-272)

Gabrielatos (2005) highlights two important methods of using corpora: a '*soft version'* and a '*hard version*' – reducing thus the initial three methods described by Leech (1997b). The former approach involves only the tutors having access to corpora, doing concordances for target words/phrases, and then presenting learners with all or just a selection of the results (Osbourne, 2000:170). This is what Gabrielatos (2005) calls 'condensed reading', and its obvious advantage is that, instead of analyzing manufactured contexts or one example text which may be poor in its coverage of the target structure, learners only see relevant contexts. It also seems that, apart from motivating students, working with corpus materials has a future with language teachers, too:

> teachers are often reluctant to read "real-life" data because they are too abstract. Providing them with authentic texts, as well as a concordance tool, has made them more enthusiastic, has helped them become familiar with the topics faster, and has helped them prepare better teaching

> materials for their students. (Foucou & Kübler, 2000:66-67)

The latter approach – the *hard version* – involves giving learners access to corpora and concordance tools in order to explore their own intuitions. It also seems to be the case that, even in the absence of well-defined tasks, learners still make good use of available resources: for instance, Bernardini highlights the fact that her students 'reported not being confused by the lack of predetermined objectives and clear instructions' (Bernardini, 2000:229). Nevertheless, adequate training is still required before resources are used to their full potential:

> Learners need to become familiar with corpora (Leech, 1997, p. 10), and in the case of the hard version, they have to be trained to use corpus software (Bernardini, 2002). They also have to be introduced to data-driven approaches to learning, and guided to develop the skills that such approaches require. They have to be guided away from the "single correct answer" concept, and the notion of fixed rules and exceptions, towards the recognition of patterns and alternatives, and the importance of context. (Gabrielatos, 2005)

Both approaches have been judged beneficial for language learning because '[t]he language insights derived from corpora go beyond questions of correct or natural use, and provide additional details about the frequency of particular language features in specific contexts' (Gabrielatos, 2005). Corpus-based linguistic investigation is also to be encouraged because it leads one to use 'independent learning strategies' on a regular basis, which 'is especially relevant if one of the objectives of pedagogy is to provide learners with the intellectual resources they need to go on learning autonomously, as is generally the case in university settings' (Bernardini, 2000:234). Moreover, such investigations also help learners discover language phenomena which are not mentioned in textbooks, but are nevertheless relevant (Foucou & Kübler, 2000:67-68).

Bernardini's 'learning as discovery model' (Bernardini, 2004:22-23) is supported by conclusive research and is proving popular. Under these circumstances, my proposal of a multilingual resource-rich reading model appears as a natural step forward. It is a balanced approach which improves Gabrielatos' model of *condensed reading* by adding a multilingual aspect (that applies to concordance lines, as well as additional linguistic resources), as well as extensive support for the rapid expansion of background knowledge.

3.4.1 Corpora and corpus building

Not many CALL applications use corpora, yet corpora have been proven to be extremely useful for linguistic investigation. Nowadays, mainly as a result of the development of KWIC – key word in context – tools, corpora are becoming more popular in translation studies and foreign language learning classes, but there is still significant resistance from tutors and developers. M3RM represents a corpus-based reading model informed by the best practice in language teaching, even though corpora are still to be used to their full potential in this area. A detailed description of the corpora used in this project and how they were annotated and manipulated can be found in sections 5.2.1, 5.2.2, and 5.2.3.

The many benefits of using authentic materials and situations for teaching languages have been widely acknowledged in the specialist literature (Leffa, 1992; CoE, 2001; Nilsson & Borin, 2002; Garrido, 2005; Yeh & Lo, 2005), and authentic corpora are the most efficient means of exposing students to this type of materials. In particular, Grabe and Stoller state that '[t]o build extensive reading in class, we have to have good text resources' (Grabe & Stoller, 2002:90). Moreover, it has been proven that language learners do adopt data-driven approaches – such as hypothesis formation and testing - if they have the necessary resources (Sripicharn, 2004:233). Therefore, any effort put into assembling relevant corpora, annotating and making them available and searchable is not likely to be wasted.

Working in multilingual environments has been acknowledged to have a positive effect, though no such CALL environments have been produced to date, and not many practitioners are aware of the requirements that need to be met

> Making authentic texts comprehensible, however, is not an easy task, especially with beginners, and some basic conditions have to be met. The first one is that students, obviously, have to interact with the original text, not a translation, adaptation or even a simplified version of it. The second one, not so obvious, is that support to the student should be given only when necessary, interfering as little as possible with the reading process of the original text. (Leffa, 1992)

M3RM uses corpora and other materials in the learner's L1 – because the 'use of the mother tongue is sometimes useful, for the sake of clarity and it is also reassuring for some students' (Holmberg, 2005:173-174) - L2 – because of the positive evidence presented in section 2.1 – and L3, as the target language.

Regarding the size of corpora, although several researchers share the view that 'there is no minimum size for a corpus' (Reppen & Simpson, 2002:94), it seems justifiable that, since learners need to encounter new words in at least 5 contexts before they acquire them (Ghadirian, 2002), the amount of text available should be sufficient to provide opportunities for sufficient recycling of new lexical and grammatical items and structures. If this criterion is not met, the specialist literature indicates that learners can fall into the trap of over-generalising because they lack the native user intuitions (Sripicharn, 2004:243).

Another argument supporting the view that the larger the corpus, the more useful it is, draws on recent findings in the field of L1 acquisition, where several studies have outlined the fact that the complexity and variety of the vocabulary used by mothers with their children had a direct influence on the children's vocabulary scores (McGuinness, 2004:219). By analogy, I hypothesise that exposing students to varied corpus resources in the target L2 and L3, while also providing useful lexical and grammatical information, will result in a sound acquisition of the L3, as well as an improvement of the learner's command of the L2.

However, as Bernardini points out, it seems that corpus-based studies have been constructed initially with small corpora in mind and, despite recent advances in computer processing power, people are reluctant to use the new resources. Traditionally, large corpora have only been used as reference materials, yet students could learn to explore them and find interesting phenomena (Bernardini, 2000:225-226). Consequently, my approach has been to build a scalable environment which would easily accommodate larger corpora and linguistic information.

Before creating a corpus, it was useful to find out what text types language students should be exposed to since, generally, they do not work on sufficient authentic texts to suit their interests, but rather on limited artificial materials combined with significant amounts of narrative texts.

As far as L1 reading education is concerned, there has been a drive lately to include all text types – as well as other different language production modes (audio, video) - in order to expose students to as much language in as many contexts as possible: *narrative* texts, where the purpose is to read in order to find and follow the story; *expository* texts, whose aim is mainly to convey information; *technical* texts, which instruct the reader on how to perform an action or reach a goal; and *persuasive* texts, which are not fiction and in which the writer is trying to convince the reader to adopt a certain attitude or idea. Narrative and expository texts are used together in equal percentages to start with, but as readers become more proficient, the other two text types are also introduced in the curriculum (Williams, 2004). The same approach was adopted in L2/L3 classes, too.

Nevertheless, other specialists suggest that the choice of using these text types may have been made in the absence of solid grounds, and that more work needs to go into investigating the comprehension of various text types both in the first language and the second/third ones: '[t]he study of the differences between comprehension of expository texts and narrative texts has been quite slim in a first language (L1) and even less investigated in a second language (L2)' (DuBravac & Dalle, 2002).

Research also indicates that narrative texts are easier to read than expository ones (DuBravac & Dalle, 2002), because readers can relate more easily to the former category than to the latter one:

> in order to make sense of a narrative text, a reader will make inferences using world knowledge very similar to those he/she uses with elements that are contained in the text, in order to comprehend the text', while 'expository texts are often decontextualised, in that they tend to address topics that are far removed from a person's everyday experience and generally do not call for an extensive use of the reader's world knowledge. In addition, expository texts are normally written for a wider audience with diverse readers who need not rely on shared experiences to understand them. (ibid.)

However, the final conclusion is that both narrative and expository texts present comprehension problems: 'expository texts may present local comprehension difficulties due to linguistic features while in narratives, readers may experience more global comprehension difficulties due to rhetorical devices' (ibid.).

Under these circumstances, it seems that the current approach to start with the same proportion of narrative and expository texts when teaching L2/L3 reading, but without appropriate support to address the comprehension problems associated with each type, is flawed. M3RM, on the other hand, supports both putting news items in context through the automatic identification of multilingual related articles, as well as the validation of the user's own hypotheses about the L3/L2/L1 lexis and grammar. Using corpora of newspaper articles for in L2/L3 reading classes has several advantages:

- such texts contain expository, persuasive, and narrative passages;
- due to their authenticity and relevance, they are more motivating than textual resources belonging to other genres;
- it is reasonably easy to gather such comparable, ad-hoc corpora.

3.4.2 Using NLP techniques in CALL applications

The research world (Felix, 1997; Barrière & Duquette, 2002; Borin, 2002; Saxena & Borin, 2002) has been highlighting the need to combine the best practices in NLP and CALL in order to, on the one hand, avoid duplicating existing research every time a CALL application is designed, and on the other hand, provide users with much more relevant information than what can be extracted without the use of NLP tools: '[i]n view of the current trend towards reusability and standardization of NLP resources, now would be the right time to initiate work on a platform - or at least a modular toolset - for the development of NLP-based CALL applications' (Borin, 2002).

M3RM addresses this very issue since my main hypothesis is that a multilingual, corpus-based reading model that provides users with extensive textual materials together with other relevant linguistic information extracted using natural language processing techniques is more effective than traditional instruction in helping users acquire reading skills in an unknown L3 which is typologically related to an L2 they have some knowledge of. Research into available TLA CALL applications has also shown that valuable NLP resources are being wasted – either through ignorance or conscious dismissal – and I have sought to demonstrate that, by projecting these techniques on a sound pedagogical background, more useful materials than traditional ones can be created in a fraction of the original time.

Furthermore, I challenge current views that NLP and corpus-based statistics are less useful than traditional dictionary-based analysis (Barrière & Duquette, 2002). The argument which these authors present is that the texts that are preferred in CALL applications, together with other resources developed by computational linguists, are 'too small to provide a basis for statistics' (ibid.). However, there are numerous corpora of newspaper articles – such as *Reuters*, *Le Monde,* or *NEGRA* – that are being used successfully for research purposes in the fields of CL and NLP. M3RM involves gathering trilingual, comparable corpora of newspaper articles and processing them with the latest NLP techniques, and the results detailed in section 5.2 indicate that such resources can be used reliably to help users acquire reading skills in an unknown L3.

Another questionable argument holds that statistical approaches cannot be used to simulate a human reading process: '[w]hile we do not discount statistical approaches and indeed are convinced of their pertinence to certain problems, we do not see how they could be used to simulate a human reading process for my purpose of text comprehension in a CALL system' (ibid.). This project demonstrates that existing resources can be combined with new NLP techniques in a novel reading model that offers more support than traditional approaches for users who are

engaged in reading for information or for content activities, formulating and verifying hypotheses about the new L3, expanding their background knowledge in, establishing connections between, and acquiring morphological information and collocational patterns in L3, L2 and L1.

3.4.2.1 Concordancers, part-of-speech taggers and lemmatisers

Some of the most widely-used NLP tools are concordancers - applications that search through electronic corpora for occurrences of user-defined input strings (e.g. words, phrases, or sequences of characters), and then retrieve and display the contexts in which the specific string appears. Users often have the possibility of sorting the resulting segments according to various criteria, such as collocations to the right or left of the target string in order of frequency, or in alphabetical order.

Despite the fact that learning words from contexts is sometimes not seen as a good idea (Stoller & Grabe, 1993), many researchers support the use of concordancers and concordance-based exercises in the L2/L3 classroom:

> […] concordances (language examples sorted by a concordancer) are likely to have the combination of linguistic and semantic support that could help learners build up a stable initial representation for a new word (Cobb, 1999). Other than the potential benefits of assisting contextual inference, concordance can boost the number of encounters with new and old words on the learner's part. This is believed to be beneficial in the acquisition of vocabulary (Cobb, 1997; Zahar et al., 2001). (Sun, 2003)

By using concordancers, students can become self-reliant and creative (Milton, 2005:246), they become involved in the discovery of the target language (Bernardini, 2000:228), in the act of learning, and queries are consequently literally initiated by themselves (Aston in Frankenberg-Garcia, 2004:216). Moreover, 'linguistic features that may be overlooked can be made salient and intertextual information that is implicit in a single text can be made explicit' (Tsui, 2005). 'Learners [also] often notice things that are unknown not only to the teacher, but also to the standard works of reference on the language' (Johns in Sripicharn, 2004:242). Finally, Barlow argues that, 'by concentrating and manipulating instances of a language phenomenon, [concordances] make the patterns stand out clearly' (in Bernardini, 2004:18).

This approach is also considered to be more efficient than traditional methods involving explicit instruction when it comes to the acquisition of L3/L2 semantic knowledge – i.e. know when it is appropriate to use certain words and together with

which other words –: '[w]ell-elaborated semantic knowledge, which includes developing knowledge of usage, collocations and other lexico-grammatical characteristics, is primarily gained through meeting words in context rather than through explicit instruction.' (Hunt & Beglar, 2005). Abstract vocabulary becomes much easier to acquire when it is studied in its native environment than when it is decontextualised and analysed under direct supervision from teachers as part of a longer list of words (ibid.). Salient features of the target language are no longer perceived as 'isolated item[s] but as part of an evolving system of interrelationships which should become increasingly differentiated as it grows' (Stern in Gabrielatos, 2005).

Using concordancers is also believed to result in the challenging of 'the role of a set text in the learning process. The text shifts from being an inviolable authority to something which students can question, explore and hopefully come to understand' (Mparutsa et al. in Bernardini, 2004:22). M3RM takes this point further, as texts are no longer presented in isolation, but in relation to other texts on similar or identical topics. Consequently, M3RM is the first – to my knowledge – reading model to allow learners to evaluate both concordances of words – through the multilingual, multi-directional query tool – and of ideas – through reading related texts in several languages. Further research still needs to go into the evaluation of M3RM when very large corpora are used as resources, as there is always the issue of sorting through the output of concordance searches in order to identify and disambiguate between several senses of the same lexical item (Collier, 1998; Renouf, 1998).

Research indicates that *recasts* are among the most useful forms of feedback when it comes to correcting and improving the learners' linguistic knowledge (DeCarrico & Larsen-Freeman, 2002:31). The *condensed reading* model (Gabrielatos, 2005) - based on learners analysing concordance lines – has been found to support both the acquisition of words and structures. It also represents an efficient mechanism to check the validity of the hypotheses that users formulate about language. I hypothesise that M3RM will be even more effective and will have a positive impact on the learners' command of the L2, as well. Despite the added complexity associated with a multilingual environment and with automatic resource processing that is not always 100% accurate, learners are likely to benefit from M3RM. Current research indicates that, with the help of concordance lines, students can evaluate their hypotheses and revise them when noticing extensive negative evidence (Sripicharn, 2004:239-240).

Nation and Meara (2002) recommend several qualitative criteria which a text in a foreign language should meet before being made available to learners.

According to them, the unknown vocabulary in the authentic materials should not amount to more than 2% of the total number of tokens; learners should be exposed to at least one million tokens per year; and 'learning will be increased if there is more deliberate attention to the unknown vocabulary through the occurrence of the same vocabulary in the deliberate learning strand of the course and through consciousness-raising of unknown words as they occur through glossing (Watanabe, 1997)' (Nation & Meara, 2002:40-41). TREAT incorporates a custom-built query tool that performs concordancing, as well as other morphological and lexical functions, in order to address these issues.

The mission of the L3 learner reader is similar in many respects to that of linguists working with ancient languages without having heard them being spoken or having been exposed to other forms of input in that language. Consequently, M3RM integrates McGuiness' description of an effective approach to learning to read in unknown languages:

> When translators work with the vocabulary of a dead language, such as ancient Egyptian, Sumerian, or Babylonian, they must see the same word in different contexts, to gain any real insight into what the word implies. (McGuinness, 2004:13)

Using a custom-built concordancer for language learning purposes represents yet another innovative feature of M3RM, because research indicates that concordances have not been used too much in language classes – they appear to be much more popular in classes focusing on translation issues, machine translation or bilingual dictionary extraction (Frankenberg-Garcia, 2004:213). Furthermore, comparable corpora have been used even less than parallel corpora, an issue which should be addressed in the near future given that much more relevant materials exist in multilingual, comparable form than as translations of each other.

The large majority of instances of corpus use have tended to focus on the target language – very often L2. Nevertheless, although the use of the L1 in the language classroom has been underplayed or completely ignored lately, there are still researchers who see its benefits – as a basis for building another language schemata (Barlow in Frankenberg-Garcia, 2004:215), or for comparison with the new language in order to create a more solid model of comprehension (Tomasello and Heron in Frankenberg-Garcia, 2004:215). Lightbown and Spada argue that '[t]eachers should also be especially aware of errors that the majority of learners in a class are making when they share the same first language background, and they should not hesitate to point out how a particular structure in a learner's first language differs from the target language' (Lightbown & Spada, 2001:152). Using

the multilingual concordances provided by TREAT, users can often notice the behaviour of the same concept in different structures across languages.

Frankenberg-Garcia suggests that, 'if the aim of instruction is to help learners with language reception skills, then the logical thing to do is to use L2 search expressions, which will produce L2 concordances aligned with L1', as well as to allow users to perform multilingual concordance searches L1->L2 and L2->L1 which can help with the identification of false cognates (ibid.:219). This suggestion is clearly made with parallel, aligned corpora in mind, yet M3RM demonstrates how similar, more complex goals can be achieved with comparable corpora by describing a multidirectional, trilingual query mechanism whose results include more useful information than target words in context – see section 5.2.4.3.

Overall, concordancers have been mainly used to teach/learn unknown words, while teaching grammar with the help of this NLP technique is seen as more challenging. One of the issues raised is that '[a] grammar pattern is normally distributed (e.g., an ing-form is required by a preposition several words distant), and grammatical patterning may be fairly tricky for learners to extract from a corpus or even to interpret when extracted for them.' (Gaskell & Cobb, 2004). Nevertheless, current NLP tools can identify collocates, as well as display words in context, so that word clusters and grammatical patterns become more transparent – and, consequently, easier to acquire: 'grammatical structures are learnt by repeated exposure to recurring patterns in language' (Ellis in Schmitt & Celce-Muria, 2002). My reading model is therefore consistent with recommendations regarding the acquisition of both vocabulary and grammar by promoting a user-controlled data-driven approach in a multilingual, multidirectional environment.

Unlike in the case of concordancers, there are very few implementations of POS tagging and lemmatisation in CALL environments. One possible explanation is that such tools are not 100% accurate. In my project I used TreeTagger (Schmid, 1994) – whose reported accuracy is of 96.36% - to process the English and French corpora, and TNT for the Romanian corpus – whose accuracy was indicated to be approximately 97% (Tufiş, 2000).

My experiment showed that adult learners who receive sufficient exposure to varied linguistic resources could identify and discard inaccurate information related to a specific token's POS or lemma even when their knowledge of the L3 was still minimal. However, future studies can be done using a set of hand-validated tagged data, and one that has not been corrected and validated, in order to determine the extent to which learner's acquisition of target language structures is slowed down by the occasional presence of tagging errors.

Furthermore, having access to lemmatisers also enabled a more accurate identification of salient lexical items for individual texts, thus making the task of grouping multilingual related articles together easier and more effective. Moreover, the functionalities of the TREAT multilingual query engine were enhanced due to the availability of lemma information, too. Learners appreciated viewing both lemmas and their realisations, and were consequently able both to understand and translate L3 texts better – section 6.4.1 - and solve tasks related to the L3 morphology – section 6.4.3. The answers to the final questionnaire addressed to the participants in the evaluation experiment highlight their positive attitude towards this type of resource: after only 5 sessions with TREAT, the majority were confident that they had acquired knowledge of L3 grammar and morphology.

3.5 Criteria for assessing the readability of a text

Insofar as the issue of presenting textual resources in a structured and user-friendly manner is concerned, Ghadirian's (2002) work was a valuable source of inspiration. She describes an approach to 'bringing foreign language students with limited vocabulary knowledge, consisting of mainly high-frequency words, to the point where they are able to adequately comprehend authentic texts in a target domain or genre.' Her article 'proposes bridging the vocabulary gap by first determining which word families account for 95% of the target domain's running words, and then having students learn these word families by reading texts in an order that allows for the incremental introduction of target vocabulary.' (ibid.)

The order in which the texts were presented to the students was established with the help of a computer programme named TextLadder which compares the vocabulary of the chosen texts against three lists of words the learners should be familiar with, keeps the texts that have more than 95% known vocabulary and arranges them starting with the text with the fewest unknown words.

This is a good model of a scientific and objective approach to selecting suitable materials for language learners because, traditionally, the text selection process is a subjective one, depending solely on the teacher. Alternatively, since it is difficult to find a large amount of authentic materials satisfying the requirements of the teacher, many times the materials received by the learners consist of artificial texts or simplified versions of more *difficult* authentic ones. Both approaches are flawed because, on the one hand, the learner is deprived of the benefit of reading authentic materials and, on the other hand, simplification is not always the best choice (Nilsson & Borin, 2002).

Syntactic complexity has not been found to be a reliable criterion for evaluating the readability of texts (Platzack in Nilsson & Borin, 2002). Moreover, my experiments with current popular text-grading algorithms such as the Fog index and the Flesch reading ease formula (Taylor, 2004) did not amount to the same results as those of Karlgreen (in Nilsson & Borin, 2002), who found that the most important factors in readability testing were word length and sentence length.

There is always the danger of looking at other languages as though they were varieties of English (Knowles & Don, 2004), and there have been attempts to adapt the above-mentioned formulas to suit the features of French – namely changing the definition of a *long word* from one which is 3 or more syllables long to one which is 4 or more syllables long in order to account for the Romance inflectional morphemes. A survey of the performance of one group of participants in my final experiment (G2 – see section 6.1) in the first translation tasks indicated that 88.29% of the L3 words that were more than 3 syllables long, and 86.74% of the L3 words that were more than 4 syllables long were translated correctly. On the other hand, short function words appeared to cause more comprehension problems than long content words. Consequently, instead of relying on one algorithm, a more effective approach was considered, which included making several text-selection criteria available – see section 5.2.3.2.

4 Are we alone (evaluation of related initiatives)?

No trilingual CALL applications have yet been developed to help users acquire reading skills in a foreign language. Nor are there any tools available for multilingual text clustering. Consequently, M3RM contains truly innovative elements. Furthermore, there have not been many attempts to combine NLP and CALL into effective digital learning environments. With regard to Nordic languages, Borin outlines that:

> [a] recent survey conducted by the author of the use of NLP technology in computer-assisted learning of Nordic languages [has revealed] some fledgling attempts to combine NLP and CALL, but most CALL applications in this area are NLP-free, and most NLP work on Nordic languages has nothing to do with CALL. (Cerratto and Borin in Borin, 2002).

The same situation applies to Romanian and possibly many other languages apart from English – which, '[i]n view of its dominant and prestigious position, […] has in effect taken the place formerly occupied by Latin' (Knowles & Don, 2004). Aston also supports the idea that a lot of studies have focused on teaching English – mainly as a second language - and very few have dealt with other languages (Aston, 2000:7).

Generally, the applications that I have come across and that were reviewed by other specialists (Gamper & Knapp, 2001b) had one or more of these characteristics:

- they were monolingual or bilingual applications – functioning in one language or from a source language into a target one;
- they provided a fixed amount of resources and exercises;
- the application generally lacked dynamism – the user often had no other option but to follow pre-defined steps;
- with the exception of three applications – OPUS (Tiedemann & Nygaard, 2003), Glosser (Alfa-Informatica, 2005) and The Compleat (sic) Lexical Tutor's Hypertext Builder (Cobb, 2005) - none of the available environments was corpus-based.
- Romanian diacritics were not supported by concordance packages or online dictionaries

- the available NLP tools ran on different operating systems (Linux for TreeTagger, Windows for the TNT tagger)

Nevertheless, several projects and resources appeared more relevant for my research than others.

4.1 EuroCom*Rom*

First of all, the EuroCom*Rom* project was meant to be perceived as 'a necessary complement to the language teaching provided in schools' (Klein et al., 2002) and it belongs to the category of initiatives with paper-based deliverables. It resulted in a textbook which includes a set of resources (lists of frequent words, suffixes, prefixes, etc.) accompanied by some example texts and guidelines covering strategies for text comprehension.

Its main outcome is represented by the 'seven sieves', seven levels at which different language learning strategies are used in order to acquire any Romance language:

> - *First Sieve: International Vocabulary [IV]* - extract words from the International Vocabulary from the text. Most of it is derived from Latin. Adults normally have around 5,000 of these easily recognizable words in their vocabulary.
>
> - *Second Sieve: Pan-Romance Vocabulary [PV]* - extract words from a vocabulary common to these languages – the Pan-Romance Vocabulary. There are around 500 words from Latin that are still current in the elementary vocabulary of the majority of Romance languages.
>
> - *Third Sieve: Sound Correspondences (SC)* - use lexical relationships between the languages by turning to the recognition of Sound Correspondences. EuroCom provides learners with all the essential Sound Correspondence formulae. The discoveries that all learners make when learning related languages, but which they often do not know how to apply usefully, are shown clearly and systematically.
>
> - *Fourth Sieve: Spelling and Pronunciation (SP)* - EuroCom*Rom* shows differences between some spelling solutions in some languages, describes the logic of spelling conventions and removes any stumbling blocks.

- *Fifth Sieve: Pan-Romance Syntactic Structures (PS)* – makes use of the fact that there are nine basic sentence types which are structurally identical in all the Romance languages. The word order of even some subordinate clauses (relative, conditional) can also be clearly understood.

- *Sixth Sieve: Morphosyntactic Elements (ME)* - provides the basic formulae for recognizing the different ways different grammatical elements have developed in the Romance languages.

- *Seventh Sieve: Prefixes and Suffixes: "Eurofixes" (FX)* - lists of prefixes and suffixes which enable us to work out the meaning of compound words by separating affixed elements from the root words. (Klein et al., 2002:24-133)

As one can see from the description of these levels, the effort of the consortium was mainly directed towards language trainers rather than learners. Moreover, the scope of this effort did not stop at learning to read, but actually extended to listening, writing and speaking, too.

Despite its rather high expectations – the title page reads 'How to read all the Romance languages right away' - the deliverables left significant room for improvement. The Pan-Romance vocabulary offered by EuroComRom is limited to 500 words, to which an additional list of 180 Latin and Greek prefixes and suffixes is added. Yet it is unreasonable to expect adult L3 learners to find them sufficient for deriving meaning from authentic texts in all Romance languages. A small study I conducted pointed out that, contrary to initial claims, the list of 'structure words of Romanian' (ibid.:210) which was said to 'make up 50-60% of the vocabulary in an average text' (ibid.) did not cover more than 11.4% of a randomly-selected EuroCom*Rom* recommended text. It seems that this project shares many features with the *Common European Framework for Languages* (CoE, 2001), especially regarding the little scientific evidence given to support statements.

Furthermore, many of the reading materials that the project advised educators to use are unsuitable according to pedagogic text-selection standards widely accepted in the fields of SLA and TLA: scientific articles and cockney rhymes, together with parallel texts such as those found on the back of crisp packets, cans, beauty products, as well as biblical texts or literary masterpieces are hardly ideal materials to support users in gaining an understanding of how the target language works.

The evidence put forward in this project as being the basis for the research and conclusions is often anecdotal at best. Such an example is that, without references to any surveys in the field, five fears associated with language learning are listed as being universal:

> *1. "I am too old: you can only learn languages as a child"*
>
> *2. "I'm no good at languages"*
>
> *3. "I'll get confused if I learn another similar language. I'm afraid of mixing them up."*
>
> *4. "If I learn a new language, I won't be able to speak my other foreign language(s) any more"*
>
> *5. "I'm not confident enough to speak a language if I can't do it correctly."* (Klein et al., 2002:12-13)

Finally, those involved in EuroCom*Rom* believe that achieving multilingual competence is 'certainly not a problem of ability or intelligence, nor even one of economies of time' (ibid.:7). Instead, it is presented simply as 'psychological and motivational' (ibid.). This view is simplistic and misleading, and it is strongly contradicted by the evidence given throughout section 2.

4.2 TextLadder

As already mentioned to some extent in the previous section, Ghadirian has implemented a very interesting method of arranging texts automatically in order of difficulty. TextLadder has been built to screen and arrange texts so that new vocabulary is introduced gradually (Ghadirian, 2002). In the author's words, the idea behind the project is 'bringing foreign language students with a limited vocabulary knowledge, consisting of mainly high-frequency words, to the point where they are able to adequately comprehend authentic texts in a target domain or genre' (ibid.).

TextLadder uses a list of the most frequent words in a target domain, as well as two other lists of words which are reported to cover 'just over 90% of running words in academic texts: West's General Service List (GSL; 1953) --which includes the 2,000 most frequent word families of English -- and Xue & Nation's University Word List (UWL; 1984) -- which is made up of words frequently found in academic texts' (ibid.). The tool designer has taken into account research that indicates that in order to be acquired, a word should be seen in context at least five times, and this parameter is also taken into account when arranging the texts. If texts that are proposed for use in the classroom do not have 95% of their tokens in at least one of the three word lists used, they are discarded. Following this process, the remaining

reading materials are arranged, starting with the one with 'the smallest number of unfamiliar words' (ibid.). The application has the functionality to record how often a word is encountered, and if this figure does not exceed 5, the tutor is informed in order to compensate using other teaching materials and strategies.

This application is one of the few good examples of a successful combination of language teaching theory and NLP processing. However, TextLadder was not designed to help users learn to read from scratch – as it already presupposes that a minimum vocabulary made up of target language the most frequent words has already been acquired -, nor has it been reported to support multilingual resources.

M3RM, on the other hand, was devised to address those issues, together with other several points raised by Ghadirian. She acknowledges that texts which are arranged for incremental vocabulary acquisition will not necessarily be just as relevant for incremental introduction of grammatical usage. Yet, given that research into the acquisition of grammar – see section 2.3.1.1.2 – highlights the advantages of using a 'spiral syllabus' (Ellis in DeCarrico & Larsen-Freeman, 2002:32) which caters for extensive recycling of structures over traditional methods that introduce grammar in an incremental way, this issue raised by Ghadirian can be addressed effectively in a CALL environment where some of the text-selection criteria are morphological or grammatical. M3RM, together with its practical implementation TREAT, make use of morphology to select appropriate L3 reading materials, and support effective noticing, interaction with and acquisition of multi-word units, proper nouns, low-encounter words and homographs, all of which are also listed by Ghadirian as problematic issues.

4.3 ELDIT

ELDIT - Elektronisches Lern(er)wörterbuch Deutsch ITalienisch (Gamper & Knapp, 2001a) – is a dictionary for German and Italian built on multimedia and hypermedia technologies. Its designers report that it contains extensive textual, audio and visual information for each word: '[t]he system contains a user model, adapts its content to the individual needs and preferences of each user and guides the user through a systematic and individually shaped vocabulary acquisition process' (ibid.). It also uses a corpus of approximately 300 texts for each language which users read with the help of the bilingualised dictionary – or 'semi-bilingual dictionary' in the authors' terms - that each word is linked to. Evaluation has been implemented in the form of questions about the target text, and a peer review system was under consideration.

Such an environment is not without merits, yet it is rather difficult to maintain and expand. It as nevertheless an example of successful use of hypermedia and it informed the design process of M3RM.

4.4 ERO

Sun discusses the Extensive Reading Online (ERO) programme, 'an online reading platform featuring specific needs for EFL learners in Taiwan' (Sun, 2003). It features student, as well as teacher interfaces, a concordancer, 'stage-by-stage reading strategy training, and text annotation functions' (ibid.). Its authors argue that it provides limitless, authentic reading contexts and that it also 'fosters learner autonomy and long-term reading interest' (ibid.). Yet this application is neither multilingual and NLP-based, nor is it designed to support the acquisition of reading skills by learners completely unfamiliar with the target language.

4.5 OPUS

The OPUS project (Tiedemann & Nygaard, 2003) is, to my knowledge, the initiative during which the largest collection of multilingual, parallel resources was assembled. Its materials could be divided into two categories: technical – containing the following corpora: the OpenOffice.org, KDE system messages, KDE manual and PHP manual – and administrative/legal – made up of the European constitution, as well as EUROPARL (European Parliament Proceedings 1996-2003) corpora. The technical resources are reported to incorporate 30 million words in 60 languages. Moreover, most of the texts are said to be sentence-aligned and some data was POS tagged and lemmatised. The project also created a query interface based on the IMS Corpus Workbench[2]. Although useful for research, this resource may not be suitable for language teaching mainly because the translations in the technical corpora were not necessarily done by professionals and were not checked/proofread in a supervised setting. The EUROPARL corpus, though only available in the official languages of the EU, is nevertheless a valuable and reliable resource for language and translation classes.

4.6 Verbix

Verbix is a resource which combines the features of a multilingual glossary with those of an on-line verb conjugator (Verbix, 2005). It covers a significant

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[2] http://www.ims.uni-stuttgart.de/projekte/CorpusWorkbench/

number of languages and it was of particular interest because each Romanian verb which is conjugated is also linked to other Romanian verbs which follow the same pattern of conjugation. Its main limitations consist of its peculiar treatment of Romanian diacritics, the fact that the only morphological category it supports – verbs – is decontextualised, result pages are exclusively in the target language, users cannot compare structures in a multilingual environment, and consequently deriving meaning is difficult to achieve, as opposed to noticing conjugational patterns, which is well-supported.

4.7 Traditional language courses for Romanian

There are also several examples of traditional language courses available for Romanian, yet they were not designed specifically for reading. Instead, they follow the general trend of trying to assist users in their acquisition of productive competences in the target language. Such examples are: the Pimsleur Approach which claims to help people learn to speak a foreign language faster than other approaches (PimsleurApproach.com, 2005); and the Routledge *Colloquial Romanian* course for beginners (Routledge, 2005), as well as several other manuals, courses on CD-ROMs, language tapes and popular or religious books translated into Romanian (Multilingual.Books, 2005; Transparent.Language, 2005).

5 Implementing the multilingual resource-rich reading model (M3RM)

This section provides a detailed description of the materials used to test M3RM, as well as of the corpus gathering, annotation and manipulation stages involving English (L1), French (L2) and Romanian (L3) data.

5.1 Available resources

An important aspect of M3RM is the emphasis on reusing/adapting existing resources, as well as bridging a gap between corpus linguists and language teachers.

5.1.1 Corpora

Unlike in the case of English and French, where a lot of effort has been put into creating large repositories of textual materials, either in monolingual or bilingual parallel form, there are significantly fewer such resources for Romanian. Moreover, most of the Romanian corpora available contained literary texts, which is not what CALL and language teaching research has identified as being most motivating for learners.

The majority of online texts available at the start of my project did not contain diacritics, which made them unsuitable. The absence of diacritics creates significant ambiguity in Romanian, and is a very rare feature of printed materials in this language, as opposed to online ones. However, the initial technical difficulties that may have prevented authors from publishing online materials containing diacritics have been overcome with the appearance of Unicode, and it is now just a matter of educating the community to make the best use of the available technology.

I believe it would have been a mistake to gather Romanian corpora without diacritics simply on the basis that, at the start of the project, such materials were the most widely spread on the web. First of all, doing that would have led to considerably less accurate results from the POS tagger and lemmatiser. Secondly, all official documentation – which is what translators are most likely to have to work on – contains diacritics. Consequently, it would have been bad practice to train translators on a set of data whose features they were unlikely to meet frequently in their careers, and it would have also been significantly more difficult to explain and solve the ambiguities that the absence of diacritics brings about.

5.1.2 Lexical resources

In order to create a multilingual, interactive environment, the decision was made to use the available Romanian and English WordNets, as well as a list of L1-L2 true friends. The former resources were used to extract L3 synonyms, related words and definitions for L3 content lemmas, together with L1 equivalents, related words and definitions. A Perl script was written to find relevant synsets and extract data from them.

The list of true friends represented a bridge between L1 and L2 and, as section 5.2.3.1 indicates, it enabled the process of identifying related articles between L3 and L2. It is also an example of an effective alternative one could adopt if the same resources – such as WordNets - were not available for all project languages.

5.1.3 NLP tools

Section 5.2 details the steps taken in order to process and enrich the project corpora. In short, the practical implementation of M3RM – TREAT - is built on a combination of existing NLP tools and original scripts. For instance, the English and French corpora were annotated with POS and lemma tags using the freely available TreeTagger (Schmid, 1994). Similarly, the Romanian corpus was annotated with the same type of information using an improved language model that the Romanian Academy Centre for Artificial Intelligence (RACAI) had developed for the TNT tagger (Tufiş, 2000). Furthermore, scripts were written to prepare corpora for tagging, then index and post-process them, thus creating all the support information which the custom query tool that was also developed locally would require. Other original scripts automatically identified related articles across the three languages of the project. Finally, the TREAT web interface was built from scratch and has certain original features that will be described in section 5.2.4.

5.2 Resource manipulation

To my knowledge, no trilingual, corpus-based reading model has yet been designed, as well as implemented and tested in a real learning scenario. Monolingual resources are the most frequently-used ones in language teaching (Alfa-Informatica, 2005; Cobb, 2005). It is generally in such scenarios that users can read materials in the target language and access monolingual concordances in order to (in)validate hypotheses they had previously formulated.

The only initiative I am aware of in which multilingual parallel resources were combined is the OPUS project (Tiedemann & Nygaard, 2003). Nevertheless, despite the large language coverage – 60 reported languages – and the possibility to query the corpora in order to obtain multilingual concordances for target terms, the

suitability of this resource for teaching complete beginners to read in a foreign language is limited because materials belong to very specialised domains, and because the language versions were not produced by professionals, and therefore do not read as originals.

After having considered using parallel resources, the decision was made to use comparable materials. First of all, the quality of L1 translations of L3 texts was not judged to be suitable for the project because, overall, the L1 versions were far from reading as originals. Secondly, there was no resource of parallel newspaper articles in L1, L2 and L3; only technical documentation.

Moreover, the use of multilingual comparable corpora for language learning is an under-investigated field. Elements such as the inability to align multilingual materials at sentence level have prevented tutors from using such authentic resources in their language classes. There has been no conclusive study demonstrating that learners benefit more from parallel resources than from related authentic materials, so M3RM is likely to make an important contribution to the fields of CALL and TLA.

No CALL system has yet implemented the recommendation of SLA/TLA specialists that users should have access to as many related articles as possible on a topic they are meant to read about, so that they acquire more background knowledge and are more likely to understand the target text. Yet I decided to take this suggestion one step forward, and provide users with **multilingual** related texts rather than just with L3 related texts. One of the hypotheses explored in this project is that multilingual comparable corpora can be clustered automatically according to their subject matter. The available multilingual lexical and corpus-based resources were therefore used to develop an algorithm that automatically identified multilingual related articles. The evaluation study performed at the end of the project indicated that learners did appreciate having access to such resources.

Finally, another project goal was to integrate all the functionalities that the research on SLA/TLA considers vital for learning to read in a foreign language – e.g. access to linguistic information about POS, lemma, corpus frequency of words, collocations, bilingualised dictionaries, concordances, related articles, etc. – into a user-friendly CALL environment. The results of the user questionnaire – presented in section 6.5 – show that, according to the participants in the project experiment, this goal was also achieved.

5.2.1 Assembling and annotating ad-hoc corpora

Before being able to perform all the methodological steps outlined in section 1.3.4, suitable data sources for L3 needed to be found. At the start the project there

were extremely few L3 online newspapers which published content using all the correct Romanian diacritics. Yet there was existing research aimed to address this failing and restore the missing diacritics (Tufiş & Chiţu, 1999). The first comparable corpora that were compiled within the project consisted of Romanian, French and English articles on 10 topics of interest – politics, international affairs, health issues, domestic affairs, environmental issues, sport, culture, economics, science and technology, and tourism - from at least two sources in the case of each language. In total, there were over 400 articles representing 270,000 tokens - 91,020 for Romanian, 83,338 for French, and 95,889 for English.

However, inserting L3 diacritics automatically proved to require significant manual post-processing, so a new approach was adopted, using one data source per language, and in the case of Romanian, using articles which had become available in the meantime and which were written with all the correct diacritics.

The newly-assembled corpora were still made up of on-line news items in English (131 articles), French (100) and Romanian (182). In terms of size, they were slightly smaller than the initial ones: 81,812 L1, 85,342 L2 and 71,199 L3 tokens. As far as the domains are concerned, they contained materials on 7 out of the 10 topics mentioned above – the new sources did not have sufficient materials on tourism, science and technology and environmental issues. All studies and experiments I refer to in this thesis were performed on this second collection of texts.

In order to annotate these data, a Perl script was written locally to extract only the article itself from the HTML pages in all three corpora. This way, a plain text, UTF-8-encoded file was produced for each article. The L1 and L2 corpora were subsequently processed and enriched with POS and lemma tags using TreeTagger – the procedure involved converting the files to be processed from UTF-8 to Latin1, then back from Latin1 to UTF-8. I finally used the latest language model developed by RACAI for the TNT tagger on the L3 corpus.

5.2.2 Corpus manipulation at the token level

M3RM is based on tagged trilingual corpora that are processed both at a token and at a text level – the scripts can be made available for research purposes. This involves a sequence of steps which move gradually from focusing on tokens to using the data acquired so far in order to process individual articles. A number of index files were created for each corpus, capturing information such as:

- relative frequencies of individual lemmas both within single texts and within the entire respective language corpus;
- frequencies of tokens representing realisations of those lemmas;

- coverage of WordNets for individual L3 texts.

The first step was to analyse the L3 tagged articles, compute the frequency of all tokens, record their POS, and then group them around the lemmas identified by the lemmatiser. This type of information was then used for several purposes: when searching for an L3 target token, users were also presented with the token's lemma, possible realisations of that lemma, and frequency information. Learners were thus encouraged to notice frequent L3 tokens, as well as salient features of the L3 morphology.

L3 lemma and POS information was used to extract relevant data from the L1 and L3 WordNets, namely synonyms, related words, and definitions. The list of L1-L2 true cognates enabled the extension of the support for my users to the L2, as well. These data subsequently served to identify important content lemmas for L1, L2 and L3 articles with the purpose of creating clusters of trilingual, related articles automatically – for more details, see section 5.2.3.

L1 and L2 POS and lemma information was finally used to store realisations of lemmas in these languages, too. Apart from helping the multilingual related article identification process, this improved the functionality of the query engine – see section 5.2.4.3.

5.2.2.1 Using WordNets and true cognates to enrich corpora

My research benefited from having access to aligned English and Romanian WordNets, as well as to a publicly-available list of 1,766 English-French true cognates[3]. Consequently, after POS-tagging and lemmatising the L3 corpus, L3 noun, adjective, verb and adverb lemmas could be extracted and looked up in the L3 WordNet in order to find any synsets containing synonyms and definitions for them, as well as pointers to related synsets. This way, L3 synonyms, L1/L2 equivalents, L1/L2/L3 related words and L1/L3 definitions for 62% of the noun, adjective, verb and adverb lemmas in the L3 corpus were identified. This information was vital when creating clusters of multilingual related articles – see section 5.2.3.1.

Furthermore, by lemmatising the corpora, valuable support was added to a morphological class that belongs to the function word category and therefore would not have been covered by WordNets: *auxiliary verbs.*

5.2.2.2 Identifying structurally similar tokens (SSTs)

I wanted to supplement the information obtained in the previous phase and capitalise on the fact that the L2 and L3 are cognate Romance languages, and also

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[3] http://french.about.com/library/vocab/bl-vraisamis-a.htm

on the significant influence that Latin has had on English, too. To this end, a publicly-available Perl string similarity module[4] was used for identifying similar strings. This string similarity algorithm is described in detail in Myers (1986). Unlike the method proposed by McEnery & Oakes (1996), it does not split the two strings to be compared into bigrams. Instead, it proposes to solve the 'problems of finding a longest common subsequence of two sequences A and B and a shortest edit script for transforming A into B' by showing that they are 'equivalent to finding a shortest/longest path in an edit graph' which can be done using an 'O(ND) time and space algorithm' (Myers, 1986). The threshold that was empirically tested – 0.7 (a maximum score of 1 meant that the two strings are identical) – allowed the provision of L1/L2 lexical support for an additional 18% of L3 content lemmas.

At first sight, the percentage of cases in which the combination of L1 and L2 SSTs represented useful support – by which I mean true cognates of target L3 lemmas - for understanding L3 tokens not covered by the WordNets may not seem too impressive: Ciobanu et al. (2006) quote 62% cases, as indicated by an evaluation experiment conducted on a random sample of 10% of the content lemmas not covered by WordNets.

However, looking for and using cognates is a significant feature of my reading model. The results of a more complex study, in which the same random sample of L3 content lemmas was used, support my intuition. The project corpora are indeed relatively small, yet it was initially unrealistic to expect language tutors to spend significant time assembling large collections of texts. Nevertheless, in the meantime, automatic tools for creating corpora have become available (Sharoff, 2006), which make the tutors' task a lot easier.

My initial hypothesis was that the size of the L1 and L2 corpora will have a significant influence on the usefulness of the SSTs. Evidence from a study conducted during the project supports this hypothesis. The experiment involved studying the SSTs produced firstly with 1/2 of the L1 and L2 corpora, then with 2/3, and finally with the full corpora. The L1 and L2 articles making up the 1/2 and 2/3 of the L1 and L2 corpora were extracted randomly from the L1 and L2 corpora used in the project. This way, the first phase of the experiment involved 65 L1 articles containing 38,724 tokens and 49 L2 articles amounting to 41,632 tokens. During the second phase, 86 L1 articles (54,640 tokens) and 66 L2 articles (53,987 tokens) were used, while the third phase involved 131 L1 articles (81,812 tokens) and 100 L2 articles (85,342 tokens).

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[4] http://search.cpan.org/~mlehmann/String-Similarity-1.02/Similarity.pm

Not all the SSTs that passed the set threshold were true cognates of the target L3 lemmas, yet my experiments generated progressively improving results as the size of the corpora increased. There following situations were identified:

- all the L1 and L2 SSTs were also true cognates;
- all the SSTs were also true cognates in one language, while the SSTs in the other language were either misleading or absent altogether;
- only some of the SSTs were also true cognates in both L1 and L2;
- none of the L1 and L2 SSTs were also true cognates, or no L1/L2 token passed the threshold.

The positive effects that larger corpora have on finding true cognates within the L1 and L2 SST sets is demonstrated below. **Figure 2** shows how the percentage of absent or misleading SSTs decreased significantly when the size of the L1 and L2 corpora increased.

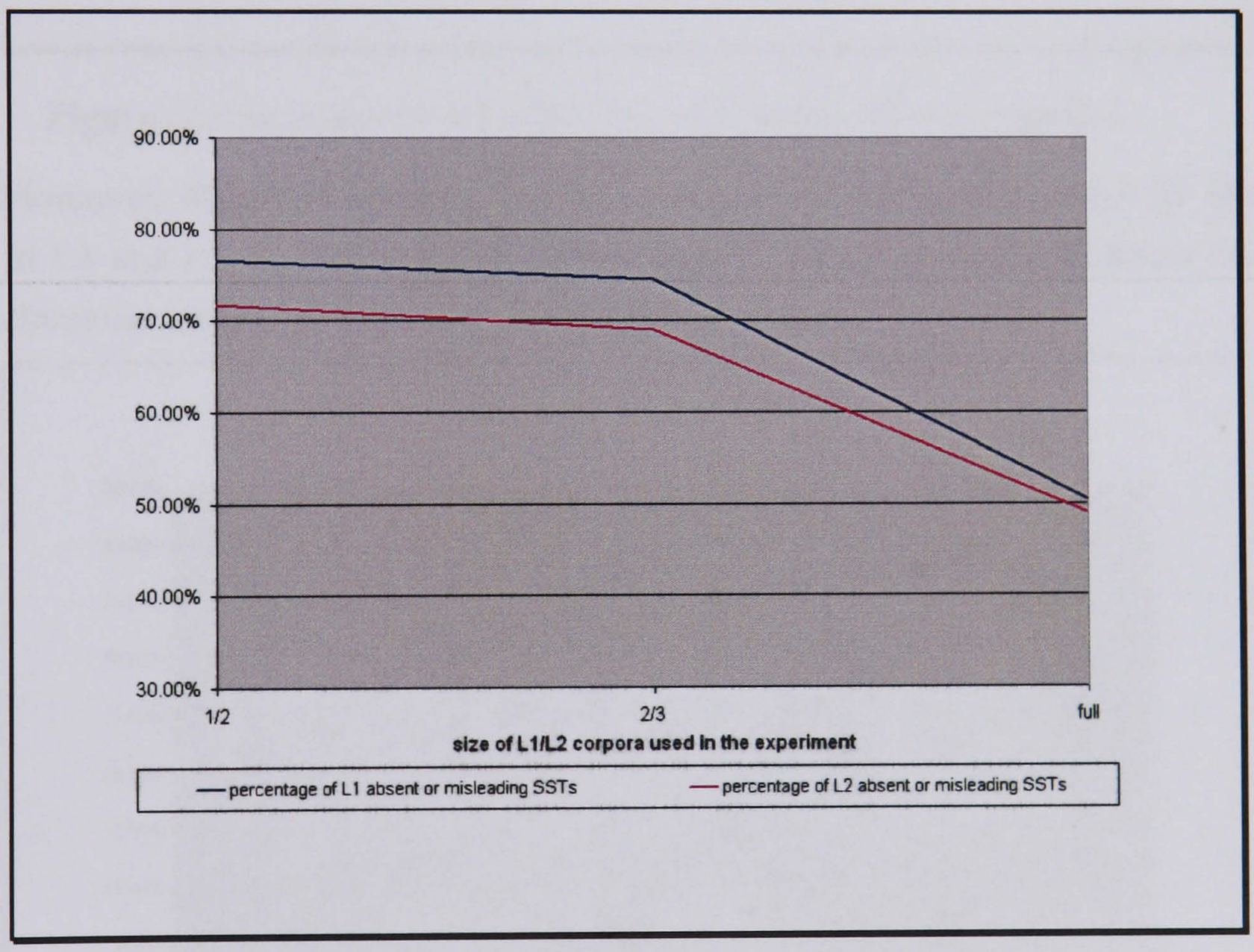

Figure 2: Percentage of missing or misleading L1 and L2 SSTs

Conversely, **Figure 3** shows that the chances of users finding true cognates within the L1 and L2 SST sets also increased with the size of the corpora.

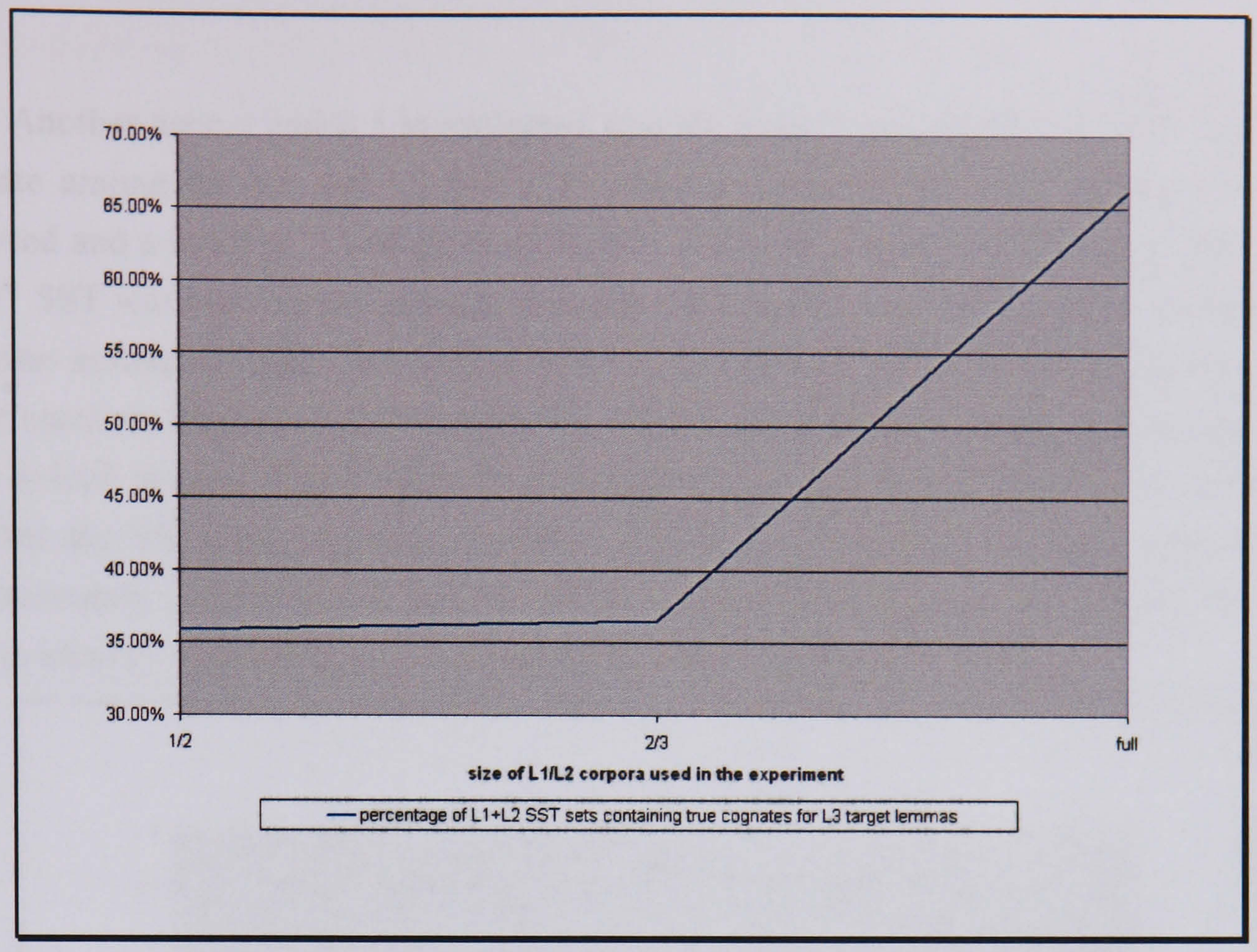

Figure 3: Percentage of L1 + L2 SST sets containing true cognates

Moreover, **Figure 4** presents how the number of situations in which all the SSTs in L1 and L2 are true cognates of the target L3 lemmas increased under the same circumstances.

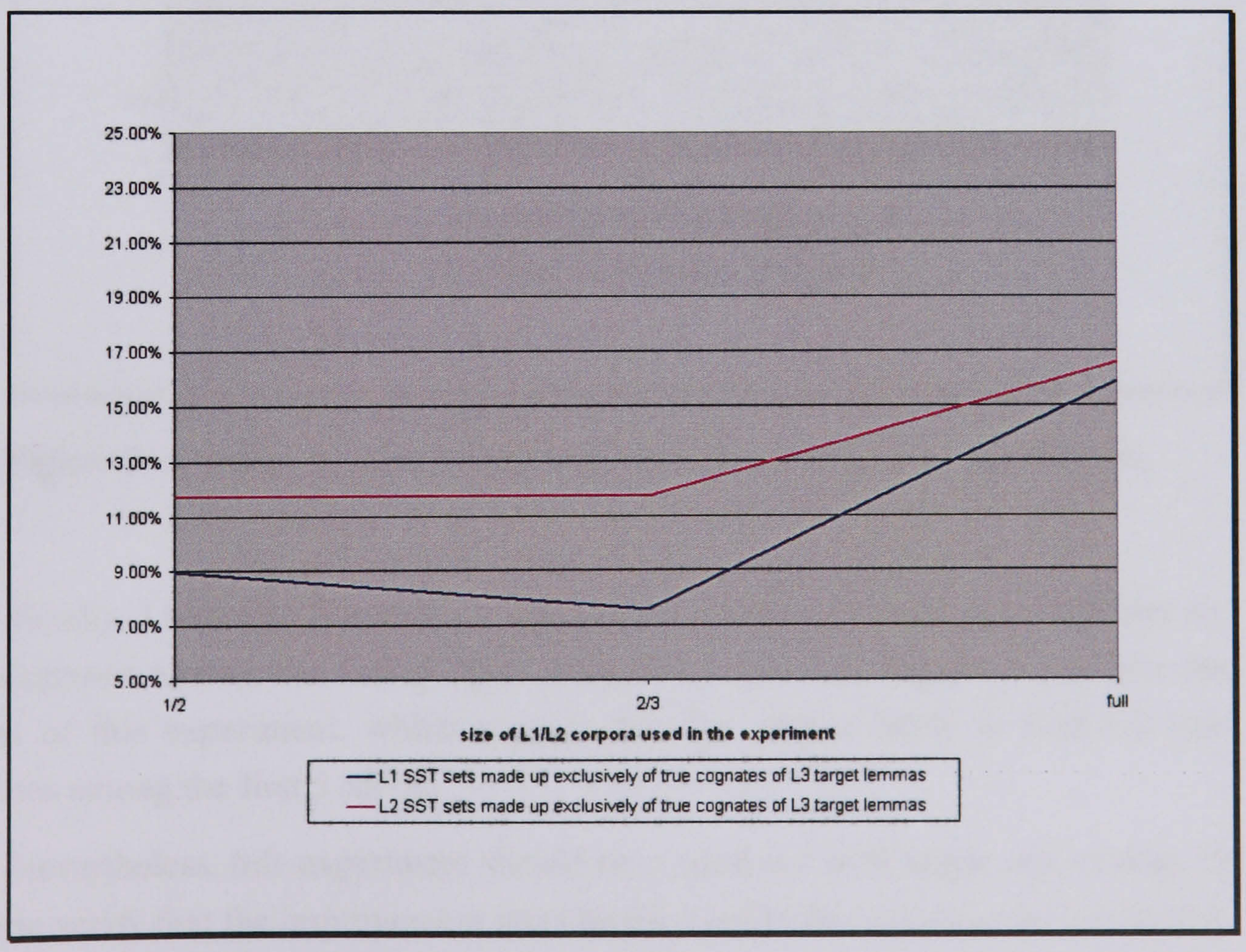

Figure 4: Percentage of L1 & L2 SST sets made up exclusively of true cognates

Another aspect which I investigated was the average position of the first true cognate among the L1 and L2 SSTs. In order to do that, the first 5 SSTs were analysed and a score of 5 was given if the first SST was also a true cognate. If only the 5th SST was also a true cognate, then the score was 1, and if there were no true cognates among the first 5 L1 and L2 SSTs, the score was 0. The rationale was that, while users are likely to read the entire list of SSTs, it would be unrealistic to expect them to look at more than 5 SSTs for each language and check using the corpus data whether the SSTs are also true cognates. **Figure 5** indicates an average score of approximately 3 for both L1 and L2, which suggests that, overall, users should be able to identify and validate a true cognate by analysing the first 3 SSTs.

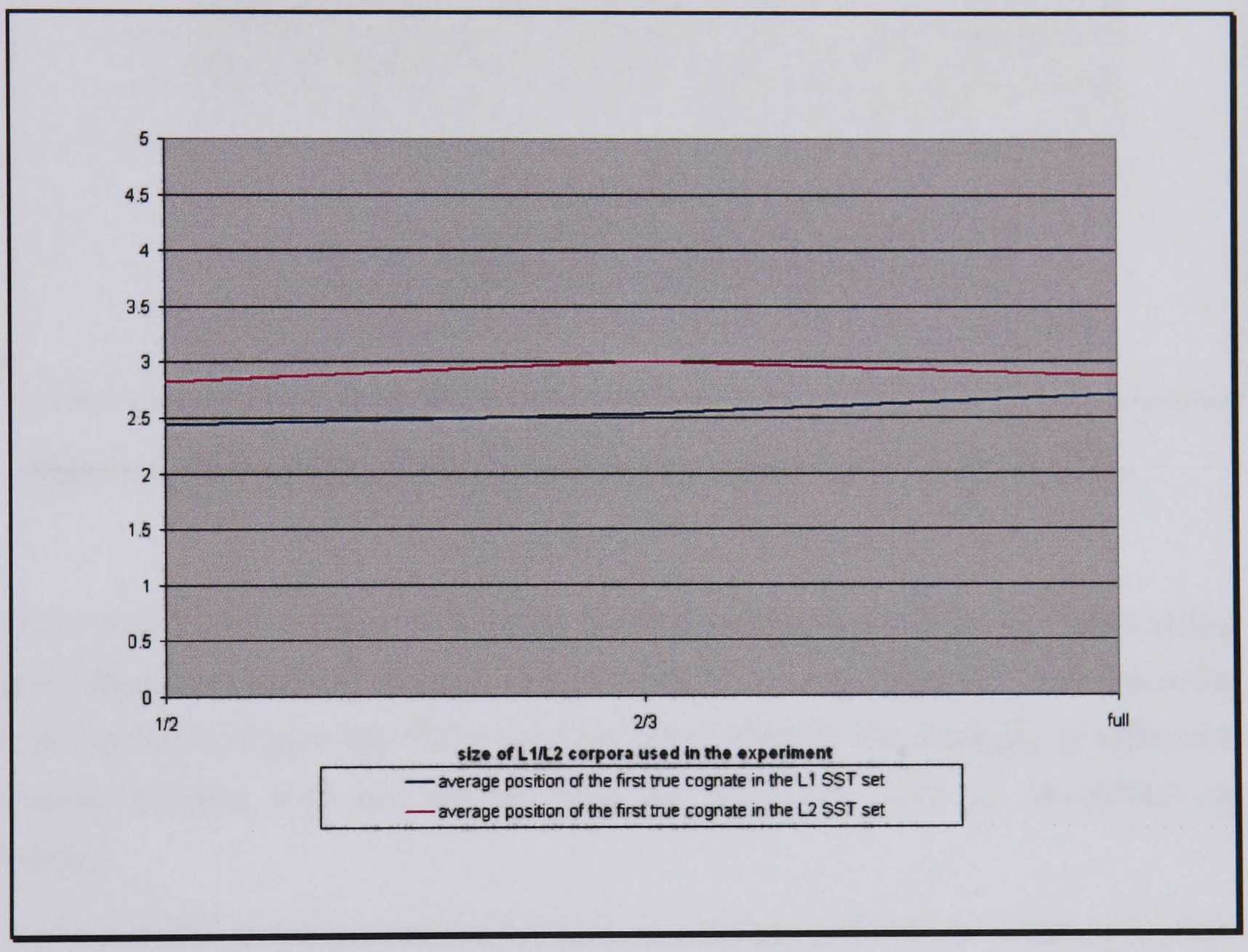

Figure 5: Average position of the first true cognate in L1 and L2 SST sets

Finally, I was also interested in finding the average percentage represented by true cognates among the first 5 SSTs both in L1 and L2. **Figure 6** presents the results of this experiment, which suggest that the user is likely to find 1-2 true cognates among the first 5 SSTs.

Nevertheless, this experiment should be carried out with larger sets of data, in order to verify that the improvement rates highlighted in this section continue to rise, and to see whether the average percentage of L2 true cognates among the first 5

SSTs resumes its growth noticed when increasing the size of the L2 corpus from 1/2 of the total corpus to 2/3, or continues to fall, as noticed afterwards.

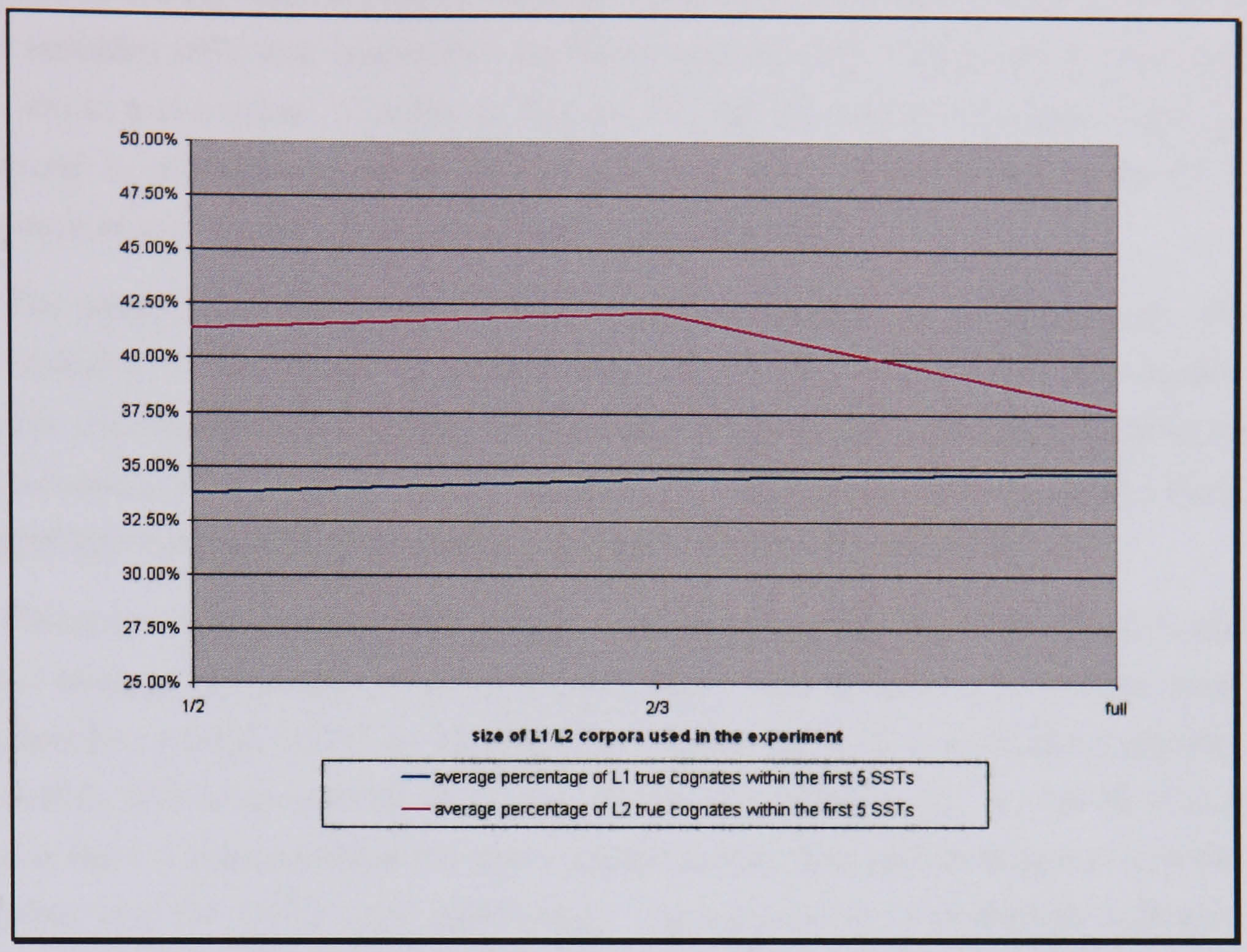

Figure 6: Percentage of true cognates among the first 5 L1 & L2 SSTs

Now that the usefulness of looking for true cognates using an available string similarity algorithm and big enough corpora has been demonstrated, here are some practical examples of how the SSTs can help users identify the meaning of unknown L3 content lemmas that are not covered by resources such as WordNets or dictionaries.

For example, in the case of the L3 lemma *candidatură* (which is the equivalent of the rather more rare L1 *candidacy* or *candidature*), the L1 SST *candidate* was also a true cognate, and so were the L2 SSTs *candidature* and *candidat*. Another such example of L1 and L2 sets of SSTs made up exclusively of true cognates is the L3 lemma *criminaliza* (meaning *to criminalise*), whose L1 and L2 SSTs are *criminal, criminalise*, and *criminalité* || *criminaliser* || *criminalisation* || *criminel* respectively:

However, there are also cases in which the suggestions include L1 and L2 lemmas that are not cognate with the L3 one. Such an example is the L3 lemma *disciplinat* (meaning *disciplined*). The L1 suggestions were *discipline* || *disciplined*, while the L2 ones were *discipline* || *indiscipline* || *discrimination*. In this example, *discrimination* is not cognate with *disciplinat*. A second example is that of the L3

lemma *exclus* (meaning *excluded*), for which the L1 SSTs are *excuse* || *exclusion* || *exclude*, and the L2 ones are *exclu* || *excuse* || *excuser* || *exclure* || *Lexus*. Here, the L1 set includes 66% true cognates – *exclusion* and *exclude* - while the L2 set only 40% - *exclu* and *exclure*. Finally, in the case of the L3 lemma *binevenită*, the L1 SST *event* is misleading, while the L2 set *bienvenir* || *intervenir* || *inventer* || *bienvenu* contains the true cognates *bienvenir* and *bienvenu*.

The natural question in such cases is whether students are able to assign the right meaning to the target L3 word and discard any misleading information. Research indicates that knowledge of a second language is particularly helpful in these scenarios, when learners need 'to selectively attend to information where there is competing or misleading information present'. (Bialystok, 2001:151).

Given that the majority of my users were largely unfamiliar with L3, it would not have been pedagogically sound to expose them to L3 reading materials that were not covered to a large extent by WordNet or helpful SSTs. This type of experiment is a possible follow-up activity. However, it was unavoidable that, in rare cases, L3 tokens in the L3 segments that the users needed to translate had no support from the WordNets, and the SSTs were misleading. The experiment nevertheless indicated that, even in 'minimally helpful contexts' (Nation in Hunt & Beglar, 2005), learners were able to discard misleading information and use the available resources to identify correct meanings for unknown L3 words and phrases.

One such example is the translation of the Romanian phrase *scurt metraj* in the segment *Pelicula "Trafic" a lui Cătălin Mitulescu a primit trofeul Palme d'Or pentru scurt metraj*. The noun *metraj* is not covered by WordNets, and the only SSTs that passed the threshold are for L1: *extra* || *metrical*, which added little or no support to the disambiguation process. However, as **Table 1** shows, the overwhelming majority of students translated the L3 phrase – as well as the entire segment – correctly.

In this case, learners had several approaches at their disposal, all of which were equally plausible, but depended on a single, very important prerequisite: the learners needed to identify *scurt metraj* as a phrase, rather than individual words. This could have been easily achieved by using the TREAT query engine: the two contexts returned for *metraj* contain the phrase *scurt metraj*. **Table 1** indicates that all but one learner identified the correct phrase.

The first approach involved the following steps:

- do an L3 concordance for *scurt* and identify its L1 meaning of *brief, short*, and its L2 meaning of *court*

- having noticed the L3 words *filmul, regizor, Palme d'Or* in the contexts for *scurt metraj*, do an L3 concordance for the first one: *filmul*
- take the L2 context *Un ensemble qui fait la matière de 'Comme une image' , le second* ***long métrage*** *d' Agnès Jaoui , un film qui se donne tout juste la peine de prendre de temps à autre un air de comédie , mais qui , dans l' ensemble , est un film pétri d' inquiétude , qui ne trouve de consolation que dans sa lucidité , par ailleurs impuissante.* as a confirmation that the L2 phrase *court métrage,* the antonym of *long métrage* is very likely to be equivalent with the L3 *scurt metraj*, and consequently mean *short film* in L1.

The second approach was similar:

- hypothesise that the L3 *metraj* and the already familiar L2 *métrage* are true cognates
- validate this hypothesis by doing an L2 concordance for *métrage* which returned an L2 context clearly about films, too: *Un ensemble qui fait la matière de 'Comme une image' , le second* ***long métrage*** *d' Agnès Jaoui , un film qui se donne tout juste la peine de prendre de temps à autre un air de comédie , mais qui , dans l' ensemble , est un film pétri d' inquiétude , qui ne trouve de consolation que dans sa lucidité , par ailleurs impuissante.*
- do an L3 concordance for *scurt* and identify its L1 meaning of *brief, short*, and its L2 meaning of *court*
- being aware of the antonymic relation between the L2 *court* and *long,* translate the L3 phrase by *short film*

Finally, the third approach involved the fewest steps:

- notice that *scurt metraj* appeared near other words related to films: *filmul, regizor*
- do an L3 concordance for *scurt* and identify its L1 meaning of *brief, short*, and its L2 meaning of *court*
- translate the L3 phrase as *short film*

Regardless of which approach the learners may have used, the advantage was that they were exposed to trilingual materials. While the second approach depends on the student using his/her already active knowledge of L2 to validate the hypothesis regarding the L3, the other two approaches are beneficial in that they activate the user's passive knowledge of L2. At the end of the experiment the

majority of students reported they had enjoyed being exposed to trilingual materials and that they had improved their knowledge of L2 to some extent.

Source segment (L3)	*Pelicula "Trafic" a lui Cătălin Mitulescu a primit trofeul Palme d'Or pentru* ***scurt metraj***
Gloss (L1)	*Cătălin Mitulescu's film 'Trafic' has won the* ***short movie*** *Palme d'Or prize.*
Users' performances	*The film "Trafic" by Cătălin Mitulescu won the Palme d'or trophy for best* ***short film****.*
	The film "Trafic" by Cătălin Mitulescu won the Palme d'or trophy for ***short film****.*
	The film Trafic by Cătălin Mitulescu has been awarded the Golden Palm in the ***short film*** *category*
	The Palme d'Or trophy has been awarded to Cătălin Mitulescu for the ***short film*** *'Trafic'.*
	The film 'Trafic' by received the golden palm trophy painted shortly
	Cătălin Mitulescu's film 'Trafic' has won the Palme d'Or for best ***short film****.*
	The film "Trafic" by Cãtãlin Mitulescu took the Palme d'Or award for ***short film****.*
	Catalin Mitulescu accepted the Golden Palm award for his ***short film*** *'Trafic'.*

Table 1: Disambiguating L3 phrases with minimal SST support

5.2.3 Corpus manipulation at the text level

'All texts have traces of other texts, and this intertextuality is indeed seen by Beaugrande and Dressler (1981) as one of the defining features of textuality in general' (Beaugrande and Dressler in Seidlhofer, 2000:210). The project corpora did not contain texts that quoted or were translations of other texts. Nevertheless, in numerous occasions they dealt with similar topics – from hurricanes to elections, health issues and sporting events.

The literature indicates that, in a motivating CALL environment, learners should both receive assistance and be left to decide on their own the path which they will take through the available resources. The way in which M3RM addressed these issues involved, on the one hand, the automatic identification of multilingual clusters of articles on similar/identical topics and, on the other hand, the creation of a set of tasks that users need to perform based on selected L3 reading material from the project corpora. Users could also select their preferred L3 reading materials using a set of criteria advised by the latest research in SLA/TLA.

If applied to supervised learning, M3RM can enable tutors to gain more control on the incidental vocabulary acquired by students, as well as be more successful in teaching specific vocabulary because they will have the possibility of making it relevant to students and of presenting it in authentic, motivating contexts together with many other multilingual supporting resources.

5.2.3.1 Identifying multilingual related articles

'Completeness is [...] relative. Arguably, no language event is an island, all are inter-related.' (Scott, 2000:107). This principle resulted in an initiative to identify related texts in the project multilingual corpus automatically. The first phase consisted of computing relative frequencies for all L1 / L2 / L3 lemmas both in the L1 / L2 / L3 corpora, and in each L1 / L2 / L3 article. Significant lemmas could thus be identified for each article based on an empirically-tested threshold – i.e. if the lemma was a content one and if its relative frequency was 5 times greater within an article than within the particular language corpus, it would be labelled as significant for that text. This principle of using frequencies to extract salient information is also used in other areas: when reading, frequent meaning units are considered the most relevant (Grabe & Stoller, 2002:25).

During the second phase, the L1 and L3 WordNets were used together with the list of L1-L2 cognates in order to compile three lists of important lemmas – in L1, L2 and L3 respectively - for each L3 article. In the case of the L3 list, it was made up of important lemmas together with their synonyms as suggested by the L3 WordNet. For L1 and L2, the lists consisted of equivalents of the important L3 lemmas.

The third phase was represented by the identification of important L1 and L2 lemmas for each L1 and L2 article respectively, by comparing their relative frequency in the article with that in the entire L1/L2 corpus.

Finally, these important lemma lists were intersected and an empirically-tested threshold was set in order to identify suggested related articles (SRAs) in all three languages of the project. The formula used was: $2xy/(x+y)>=T$, where xy represents

the number of common important lemmas between articles 1 and 2, *(x+y)* is the sum of the number of important lemmas in the two articles, and *T* is the threshold. The list of related articles was sorted starting with the one with the highest score. **Figure 7** is a graphical representation of the related article identification process in L3, which was based on the knowledge of important lemmas for each article. In this example, only L3 articles 2 and 4 are identified as being related, since only the results of the formulae *2*A1A2/(A1+A2)* and *2*A1A4/(A1+A4)* are greater than or equal to the minimum threshold *T*. Using a very similar approach, L1 and L2 articles that are related to each L3 one were also identified.

These resources allow users engaged in L3 reading to refer at any time to articles on the same/similar topics in L1, L2 and L3 in order to build up their background knowledge and notice multiple instances of authentic usage of familiar/unfamiliar vocabulary in all the project languages.

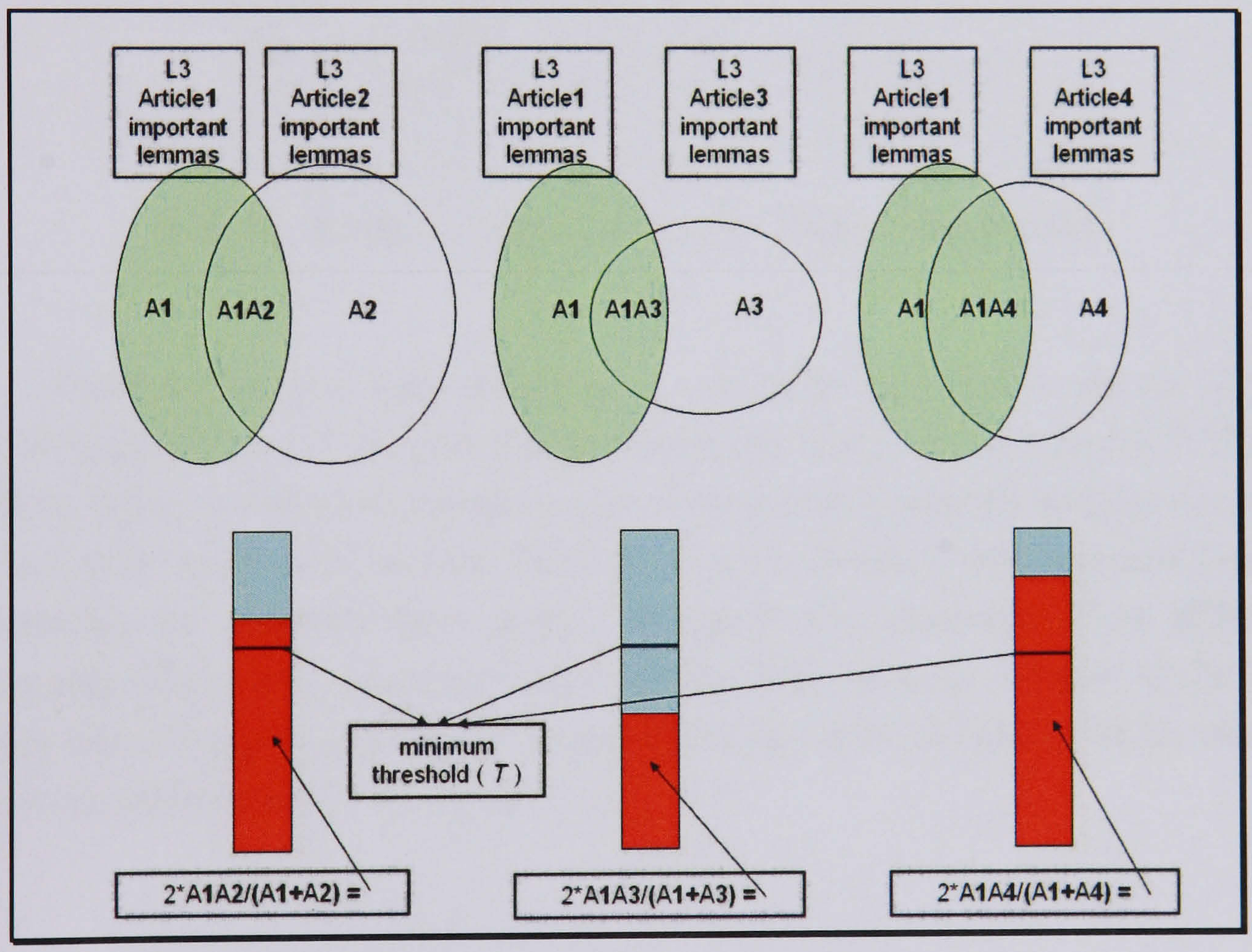

Figure 7: Automatic identification of L3 related articles

I performed a qualitative evaluation to identify the accuracy with which this original tool identified authentically-related articles (ARAs) for each L3 text in the corpus. I used my knowledge of Romanian, French and English to read individual L3 articles together with their SRAs in L3, L2 and L1, and identify whether the SRAs were on the same – or a very similar – topic as the individual L3 article, in

which case the SRA would qualify as an ARA. This way, a random sample of 50 L3 articles out of the total of 182 were analysed. I looked at the top 5 SRAs for L3, L2 and L1 and noted the position in which the first ARA was, as well as the percentage represented by ARAs out of the first 5 suggested. If the first ARA was in the first position, I gave it 5 points; if it was third, I gave it 3 points; if none of the 5 SRAs turned out to be ARAs, the score was 0 – the methodology for this experiment is identical with the one used to evaluate the L1 and L2 SST sets (see section 5.2.2.2).

Table 2 presents the results: **S** represents the average score for the first ARA; **StDev** represents the standard deviation from this score; and **P** represents the percentage of such articles among the first 5 SRAs.

	S	***StDev***	***P***
L3	4.4	1.439	70%
L2	3.9	1.723	70%
L1	4	1.774	52%

Table 2: Accuracy of automatic related article identification

These results show that, overall, users can easily find ARAs at the top of the list of SRAs, as well as the fact that, at almost any time, 2 or 3 of the top 5 SRAs will be ARAs, which gives learners easy access to several reading resources on the same/similar topic and enables them to become familiar with relevant target vocabulary and structures more quickly. **Figure 8** is an example of how TREAT integrates information regarding related articles with the actual content of the L3 target text. The right-hand side of the screen displays a list of links to SRAs, which users can follow at their own leisure.

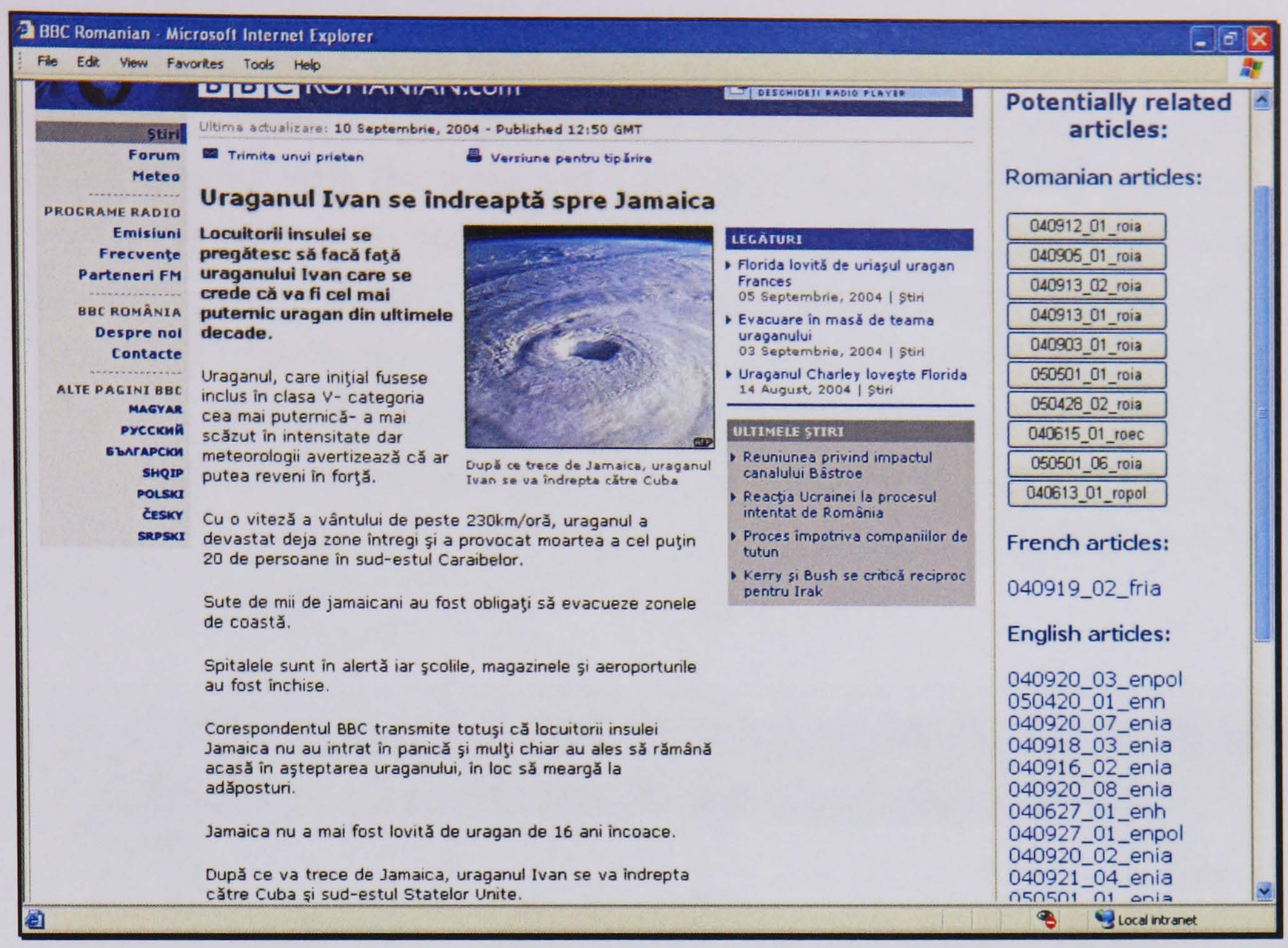

Figure 8: Example of combining SRAs with original L3 articles in TREAT

Figure 9, on the other hand, shows what they would see if they followed one link for each language of the project. They could thus read the L1 article in order to become familiar with the topic and vocabulary used, then read the L2 article to compare and contrast the point of view on the same matter, as well as the vocabulary used, and finally study the L3 article(s) in order to see multiple instances of similar vocabulary and formulate initial hypotheses about how the L3 works. This is not the only means for the user to study known/unknown vocabulary in authentic contexts. A custom-based concordance engine – also available from each page displaying an L3 article and its SRAs – represents a more powerful tool which does more than return contexts for particular words (see section 5.2.4.3).

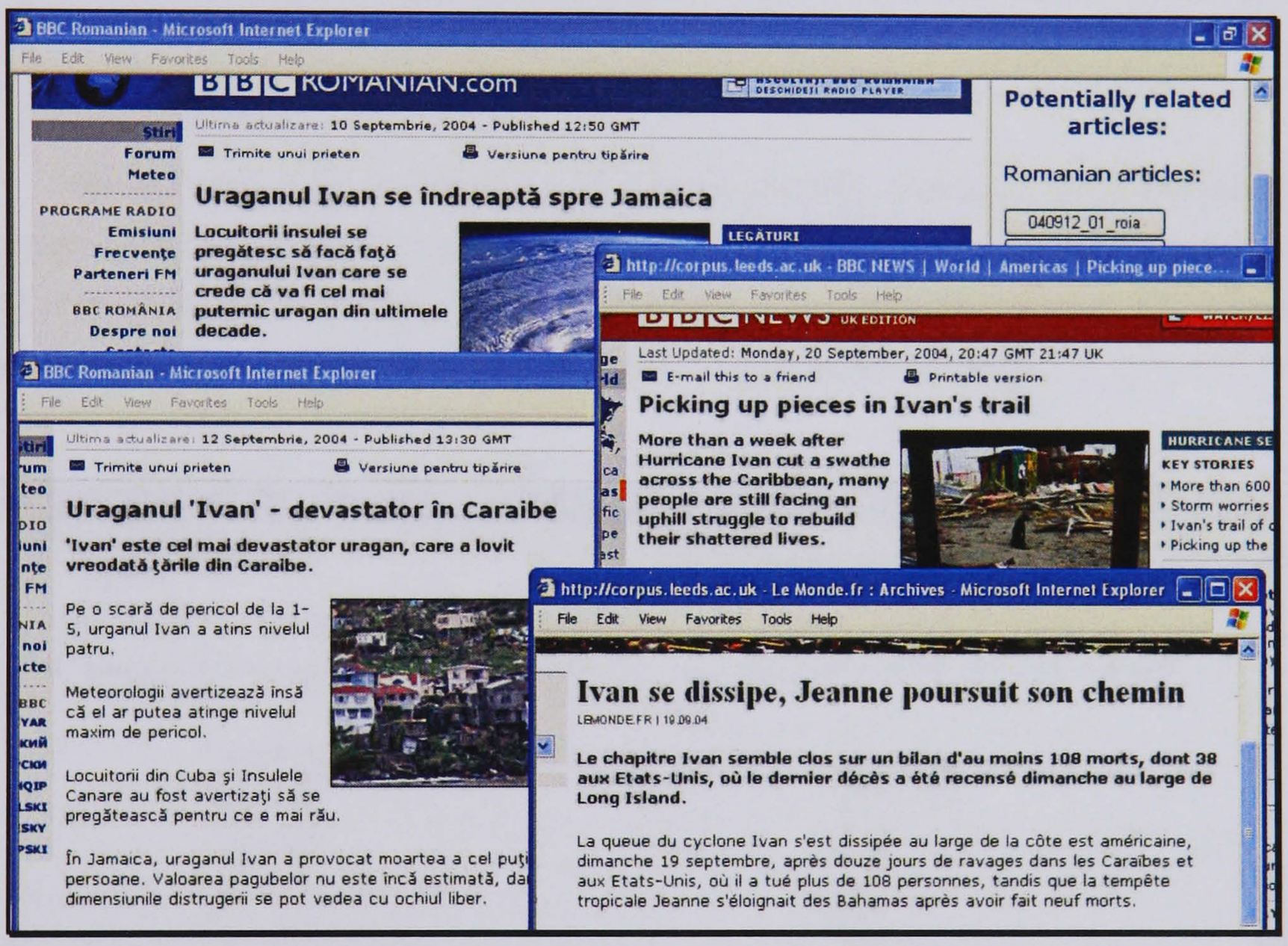

Figure 9: Accessing SRAs in three languages from within TREAT

5.2.3.2 Implementation of text-selection criteria

As already mentioned in section 3.5, the traditional text-selection criteria were not considered entirely useful for this project. **Table 4** in section 6.4.1 is an example that translation errors were not necessarily caused by misunderstanding the long L3 content words, but rather the short L3 function words, which would have had no impact on the traditional readability scores.

Consequently, M3RM made available a new set of criteria:

- article length;
- average sentence length;
- publication date;
- the occurrence of a particular part of speech in an article more frequently than in the entire L3 corpus;
- lexical density score;
- number of SRAs in L3/L2/L1 or in all of these languages;
- percentage of L3 content words covered by the L1 and L3 WordNets, as well as the L1-L2 wordlist;
- domain.

All the necessary information was automatically extracted from the project corpora with the help of a local Perl script which processes resources dynamically and returns those L3 reading materials the user is interested in. **Figure 10** presents the text-selection options that users of TREAT have at the moment.

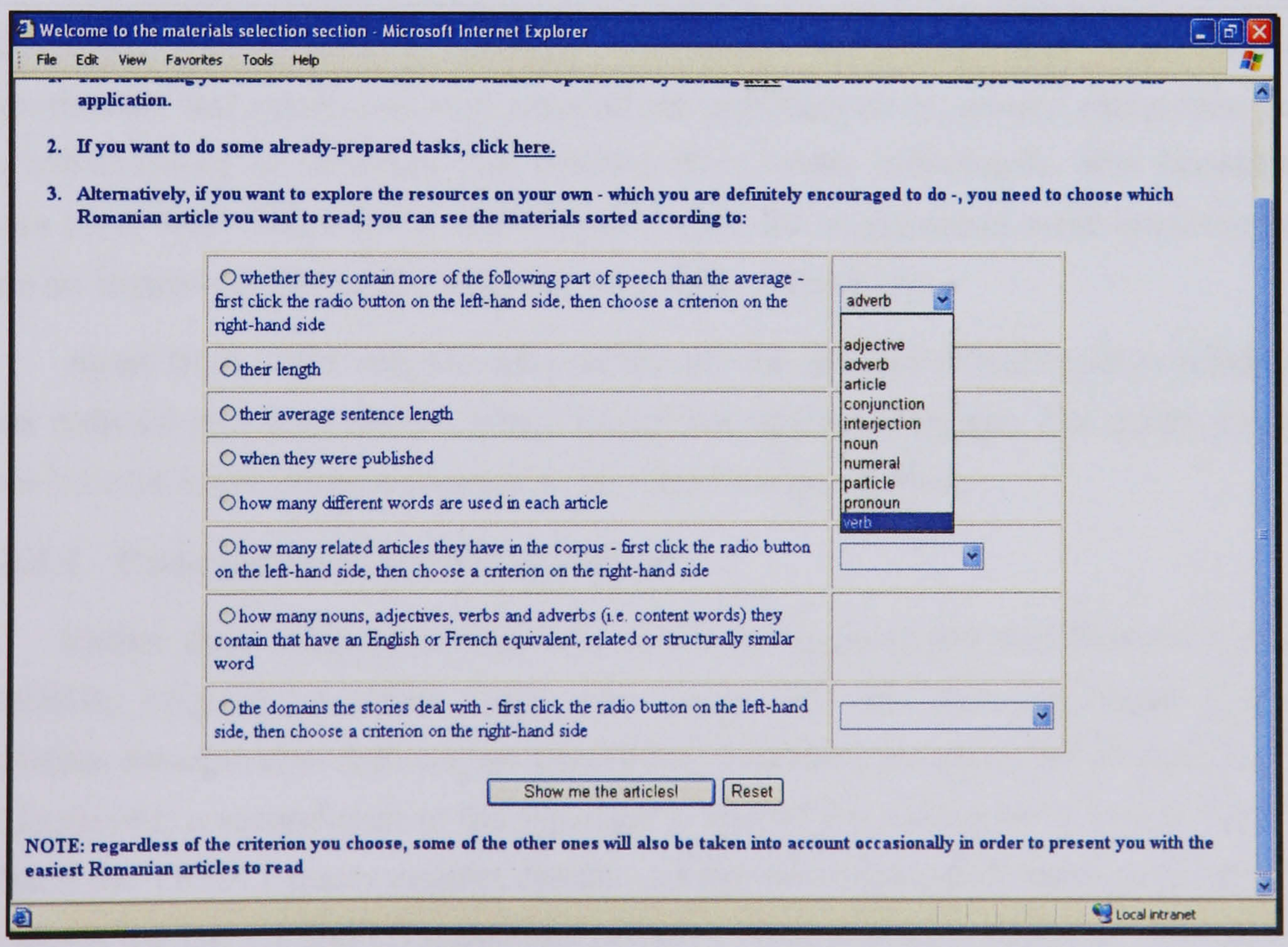

Figure 10: TREAT text selection criteria

The results of the user survey – detailed in section 6.5 – indicate that, although the participants had predefined tasks to perform, which were placed in a separate

area of the interface, 40% of them still found the text-selection criteria stimulating enough to explore in their own time. However, a more conclusive study is needed in order to establish accurately how much students can benefit from the current set of criteria incorporated in the interface.

5.2.4 TREAT

The Trilingual REAding Tutor (TREAT) represents the practical implementation of the novel reading model designed using SLA/TLA, CALL and NLP research, and is meant to fulfil many purposes, from providing a friendly and familiar environment for users to read multilingual materials in their native format, to enabling L3/L2 acquisition through added functionalities.

5.2.4.1 Evolution and general design issues

In order for TREAT to evolve and handle multilingual information, it was necessary to use standards consistently. The most significant example is the consistent use of data encoded in Unicode (UTF-8). Other encodings were occasionally used for tagging and lemmatising the L1 and L2 corpora - apart from only running on Linux, at that time TreeTagger only accepted Latin1 files. However, the final data was stored in UTF-8.

The second major issue in the development of TREAT was whether to have stand-alone installations, or a unique web-based environment. The first round of experiments was conducted with stand-alone installations on several computers, and an initial round of feedback was elicited from users. Afterwards, also benefiting from more knowledge about web-based CALL, the suggestions were implemented into an improved application that was accessible off-campus.

Apart from improving the general layout, the number of information windows was reduced and information was compressed and reorganised. The query engine also became much faster compared to the first implementation.

5.2.4.2 Presentation of textual resources

Rather than using plain text files for showing users the multilingual content available, original L3 HTML files were integrated with their full layout into an interface structured as follows: an area (the largest one) in which the original article is displayed; a second area at the top right corner of the screen from which one can launch the TREAT query engine; finally, a third area situated on the right-hand side in which the L1, L2 and L3 suggested related articles (SRAs) are listed – see **Figure 11**.

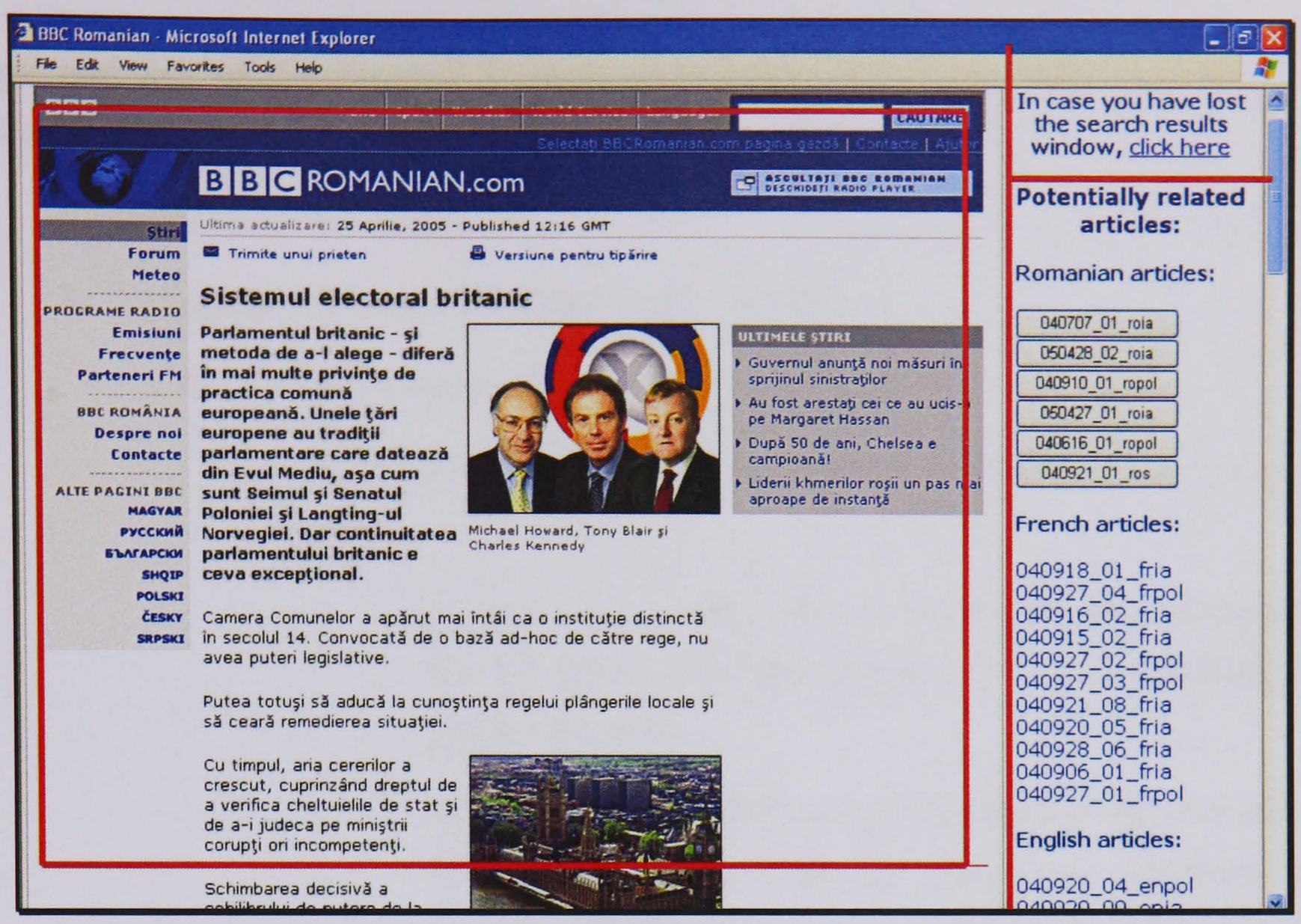

Figure 11: L3 article in TREAT

Furthermore, users can access reading materials in all the languages of the project from within the concordance window: each concordance line is linked to the article it comes from. All in all, I have aimed to produce a simple and effective environment that combines familiar elements – such as displaying on-line articles in a web browser – with innovative/less usual ones – i.e. access to SRAs, concordance lines, text-selection criteria, or multilingual linguistic information.

5.2.4.3 The TREAT multilingual, multidirectional query engine

Although the popularity of Unicode has increased significantly over the past few years, a local query engine needed to be implemented because the most popular and user-friendly concordancers on the market had problems displaying Romanian diacritics and integrating all available data – multilingual POS tags, lemmas, WordNet information, and string similarity results. Overall, I seem to have had the same experience as many other researchers who, although aware of several available tools, needed to build their own in order to meet all their requirements (Danielsson, 2004:225).

The TREAT query engine is a multilingual one that currently accepts only tokens – more effort can be invested into adapting it to handle multiple-word expressions; in the experiments, the possibility of looking for several words at a time was replaced with a functionality that displays the most frequent collocates to the

right and left of the target L3 token in context. The query engine features the following phases:

Looking up an L3 token

I. type/paste the target L3 token in the search box

A. the query engine starts working on three aspects:

1. identifying relevant linguistic information for the L3 target token

a) it uses L3 index files to extract all the lemmas that the L3 lemmatiser had previously associated with that particular token

b) it extracts the following information when available for these lemmas: POS, L3 synonyms, definition and related words; L1 equivalents, definition, related words and SSTs; and L2 equivalents, related words and SSTs

c) all the possible realisations of these lemmas are extracted, together with their POS and number of occurrences in the current L3 corpus

d) collocations are identified to the right and left of the target token (minimum threshold = 3 occurrences), then hyperlinked to the concordance lines in which they appear

e) all the above-mentioned information is displayed together in the left area of the query results window - **Figure 12** presents a section of this area, containing the adjectival realisation of the lemma *clar* which was identified by the lemmatiser for the L3 token *clar*. This figure also displays the L1 and L2 SSTs, as well as collocations to the left of the target token.

2. identifying and displaying concordance lines in L3

a) the engine looks through the entire appropriate language corpus for sentences in which the target token appears.

b) it stores the sentences, as well as the name of the article they come from

c) it creates hyperlinks and *alt* attributes for each token in the concordance lines, so that if the user hovers with the mouse over any token, a caption containing the POS assigned to that particular token appears; I believed that, in a teaching environment, it would be unrealistic to expect users to be familiar with 3 tagsets, therefore I offer two ways of presenting the same information: the POS tag itself, together with its verbose meaning. Thus, in the case of the adjectival realisation of *clar*, the caption reads *ASN: Adjective qualificative superlative singular –definiteness.* Moreover, the hyperlinks enable users to do instant word queries simply by clicking on the desired words in the concordance sentences. This way, the intermediary copy/paste/click phase is removed and efficiency increases.

d) the engine uses collocation information in order to display the sentences containing the target word in descending order of frequency of co-occurrence.

3. Identifying and displaying concordance lines in L1 and L2

   a) the engine uses the L1 and L2 lists of equivalents, related words and SSTs in this order. It searches the L1 and L2 index files in order to find the first one which appears in the list, as well as the respective language corpus.

   b) as soon as it finds the first one in each language, it performs steps 2.a)-2.c) for both L1 and L2

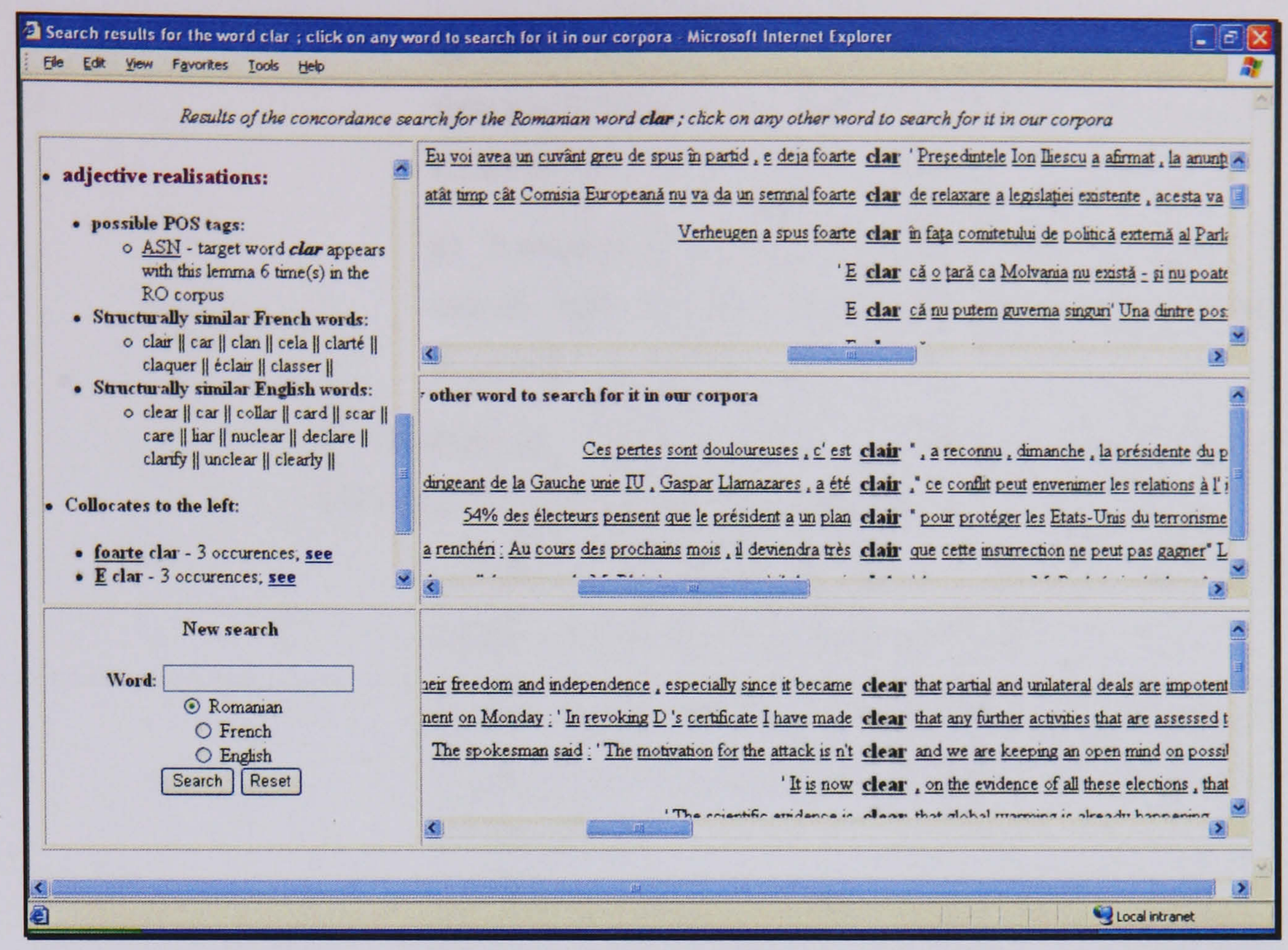

Figure 12: TREAT - query results for the L3 token *clar*

Looking up an L1/L2 token

As **Figure 12** shows, the TREAT query engine enables users to look up L1 and L2 tokens, too. However, it does not simply return L1/L2 concordances, but it seeks to link the – this time – L1/L2 target token to L3 information, as well. The steps followed are the following:

II. type/paste the target L1/L2 token in the search box

A. the query engine starts working on three aspects:

1. identifying concordance lines for the target token

a) the engine uses the L1/L2 index files to see whether the target token appears in the corpus

b) if the result is positive, it performs steps I.2.a)-I.2.c) for it

c) if the result is negative, the engine assumes the target token is not lemmatised, and it checks other index files to see if there is a lemma associated with the target token in the corpus

d) if this second result is positive, the engine picks the first realisation of this lemma and performs steps I.2.a)-I.2.c) for it

e) however, if this second result is also negative, the search ends and the user is informed that the corpus does not contain the target token

2. identifying relevant L3 information together with information in the remaining language

a) the engine finds the lemma corresponding to the target token in the respective language

b) the engine uses the L3 index files to find the first L3 lemma which has the target lemma as an equivalent, or related word.

c) if this result is negative, it searches for the first L3 lemma which has the target token/lemma listed among its SSTs

d) once it has found an L3 lemma that meets these criteria, it then performs steps I.1.b) – I.3.b) involving the L3 and the remaining project language.

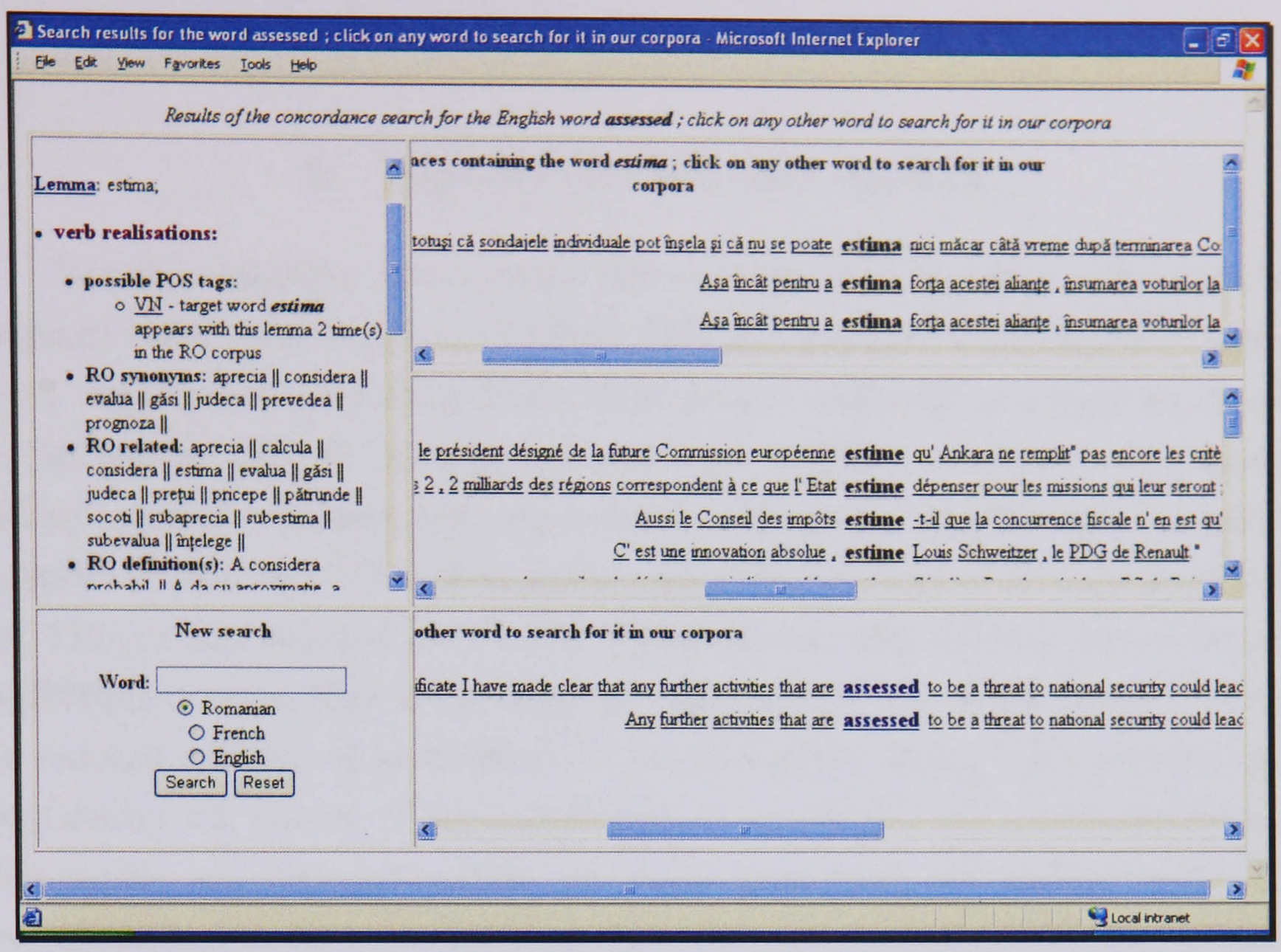

Figure 13: TREAT - query results for the L1 token *assessed*

In the situation illustrated by **Figure 13**, the query engine found *assessed* in the L1 corpus, and therefore carried out a concordance search for it. Yet it found no L3 lemma linked directly to *assessed*. Consequently, it took the target token as a non-lemma, and was able to identify *assess* as its lemma in one of the L1 index files. It then found the L3 lemma *estima*, and performed a concordance for its first realisation, *estima*. Given that there were no L2 equivalents or related words, the engine had to rely on the L2 SST set *estime* || *estimer* || *estimation* || *festival* in order to provide learners with relevant materials in this language, too. Consequently, it performed a concordance for the token with the highest similarity score to the L3 *estima* – namely *estime* – and displayed the results.

By presenting information in the following order: L3, L2 and L1, M3RM seeks to engage learners in using their second and third languages before obtaining answers more easily in their native one. The results of the user survey – presented in section 6.5 – indicate that this strategy was successful to some extent. Moreover, by incorporating a multilingual, multi-directional query engine, M3RM also provides a lot more assistance than other reading models do with the help of current concordance packages.

6 Experiments and data analysis

Several specialists recommend that research into language acquisition and language teaching be taken out of laboratories and into real environments (Chapelle, 2004; Hegelheimer & Tower, 2004). This project addressed this issue by creating the interactive TREAT environment and then recruiting a number of volunteers willing to spend some time learning to read in Romanian. The participants needed to complete several tasks, then their performance was analysed to see whether M3RM and TREAT had reached their goals. Feedback was also elicited, and subsequent modifications made. Due to the relatively small size of the corpora used, as well as the reduced number of participants in the evaluation phase, I am guarded about generalising the results of my experiment. Nevertheless, the initial outcomes are encouraging and they prove that our initial hypotheses are correct. Work is in progress at the Leeds University Centre for Translation Studies in setting up similar experiments involving bigger corpora and more different languages.

6.1 The users

I looked to recruit adult English (L1) native speakers with some knowledge of French (L2) who had some time to experiment learning to read in Romanian (L3). Since M3RM and TREAT had been designed with translators in mind from the start, MA students in Applied Translation Studies at the University of Leeds Centre for Translation Studies, were invited to take part in my experiments. With some difficulty related to the availability of the target users, the experiments were conducted in 2005 with 2 groups: G1 and G2[5].

G1 was made up of 8 MA students, none of whom had any knowledge of Romanian. G2 consisted of 7 MA students, some of whom had previously attempted to learn Romanian.

6.2 The briefing session

Before giving users access to TREAT, I organised a 15-minute introductory session in which I explained the system architecture – e.g. the nature of the resources, the way in which they are manipulated, as well as the different parts of

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[5] Due to an oversight, in Ciobanu et al. (2006), the two groups were labelled differently: G1 in that paper is what I call here G2, while G2 in that paper is what I call here G1

the interface (the article selection criteria and the query tool). As I was introducing elements, I was also demonstrating them. This way, I showed students how they can view an article in Romanian, access related articles in Romanian, French and English, and use the query tool for words which they did not understand or which wanted to see in more contexts, regardless of the language. I also demonstrated the different areas of the query results – e.g. the linguistic information area and the multilingual concordance areas - and how the query mechanism had been optimised to give them instant access to sentences containing collocations for the target Romanian word, the entire article in its native format from which contexts had been extracted, or other query results for any word in any language present in the multilingual concordance lines. Finally, I demonstrated how all these functionalities can help one acquire knowledge of the morphology target language - e.g. how the use of POS-tagged and lemmatised corpora enables the query tool to present the user with several realisations of the same lemma in context and indicate whether these are singular/plural/masculine/feminine/nominative/accusative/genitive/dative forms in the case of nouns and adjectives, or past/present/singular/plural, 1st, 2nd or 3rd person forms in the case of verbs. I also showed the participants how one can acquire knowledge of L3 structures (by looking at frequent collocations in context), compare them with L2 and L1 contexts which contain translation equivalents of the L3 term, as well as gain multilingual background knowledge and vocabulary on a particular topic by referring to multilingual related articles.

The following 15 minutes were spent answering users' questions, doing more example queries and viewing their chosen articles in order to help them become comfortable using TREAT, as well as explaining several linguistic terms to them, such as *lemma*, *POS*, *cognate*, *concordance* and *collocation*.

The information I presented in detail at the beginning of the briefing session was also summarised on the home page of the TREAT interface in order to refresh the users' memory and make sure they are aware of all the functionalities of the interface.

The feedback received from students was positive and very encouraging: the TREAT interface was perceived as user-friendly, the unique variety of the resources used was appreciated, and the originality of the approach and its implementation were highlighted as important features, too.

6.3 The tasks

Given the focus of the project on reading skills, the tasks assigned to the participants consisted mainly of translations of passages of various lengths – ranging

from captions and sentences to a complete article – from L3 into L1. Furthermore, although they were sometimes explicitly asked to reflect on a number of issues related to the morphology of the L3 (and occasionally L2), the number of tasks involving simple morphological analysis was kept to a minimum. The view that 'language reception problems can be spotted through reading comprehension exercises' (Frankenberg-Garcia, 2004:223) was adopted and, as a result, the proportion of tasks involving reading comprehension, article summarisation, scanning, skimming and translation was greater than that of those requiring students to identify salient features of the L3 morphology.

Both G1 and G2 had to perform the same first set of tasks. The difference between them was that, while G1 were using TREAT, G2 had to rely on freely-available electronic resources for L3, such as bilingual glossaries. Overall, although G1 had less knowledge about L3 before starting the experiment, they performed better in translation tasks, as well as those on L3 morphology. On the other hand, G2 made rapid progress in their knowledge of L3 once they had started working with TREAT.

6.4 Detailed performance of users

6.4.1 Performance in translation-related tasks

The evaluation of the users' performance in the translation tasks was done by independent reviewers – native L1 speakers – who had access to the users' randomised and anonymised translations and summaries, and graded them for content (by comparison with a gloss or model provided by a native L3 speaker) and style (indicating how natural the translations sounded in L1)[6]. The maximum score awarded was 5, and the minimum was 1. **Figure 14** presents a comparison of G1 and G2's performances for the first translation task – *T1* - from which the better performance of G1 is evident.

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[6] see Appendix 2 for the full evaluation questionnaires

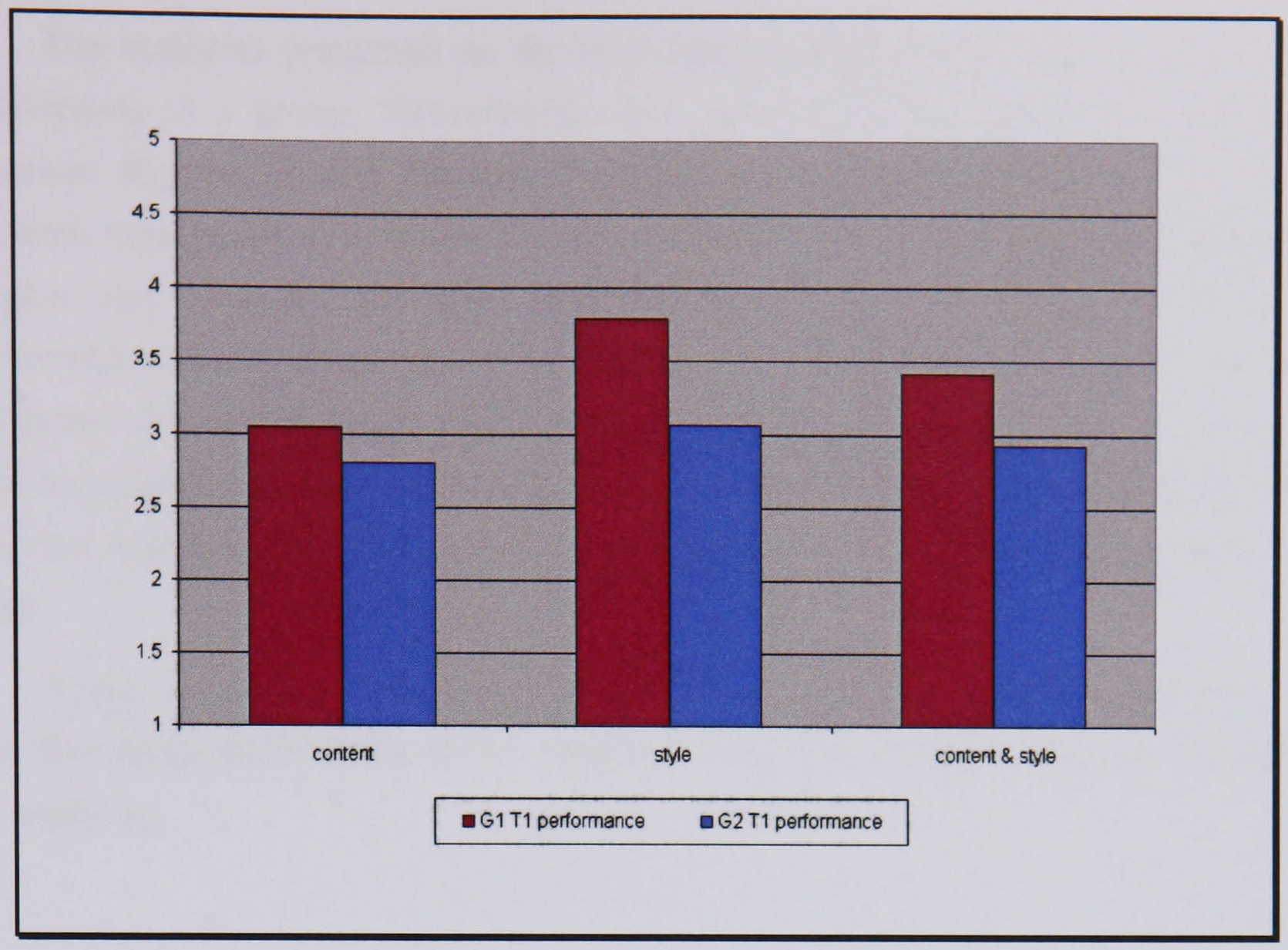

Figure 14: Comparison of G1 and G2 performance for the first translation task *(T1)*

Moreover, it was also encouraging to see that G2 made progress in learning to read in L3 – and consequently translate from L3 into L1: **Figure 15** shows a significant increase in the quality of the users' translations when they had access to TREAT (during translation tasks 2-4 – *T2-T4*).

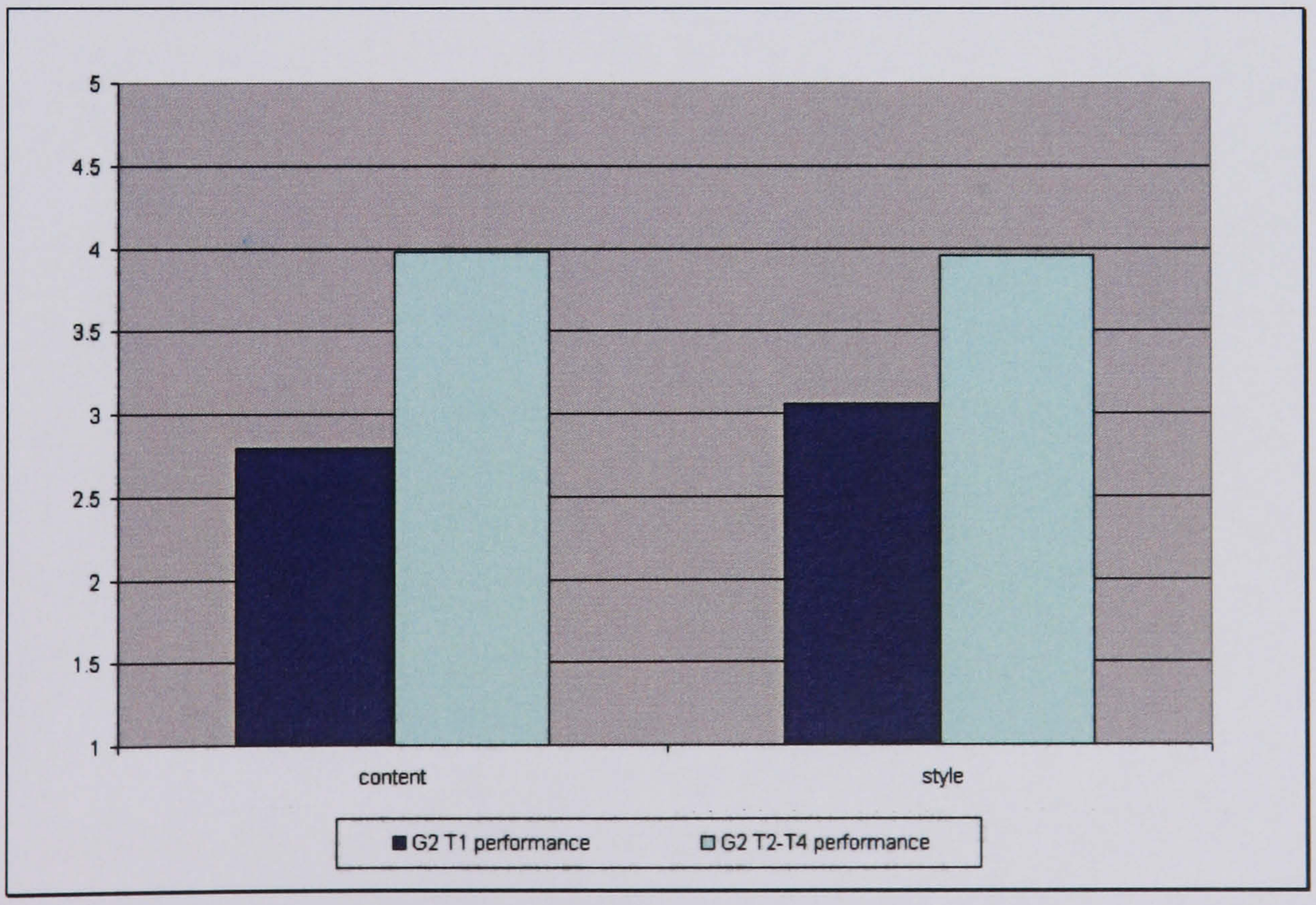

Figure 15: G2 performance for *T1* compared to *T2-T4*

The statistics presented so far have only compared the performances of the participants as a group. Nevertheless, it is also worth following their individual progress. **Figure 16** and **Figure 17** present the progress of each of the 7 MA students making up G2 in the L3-L1 translation tasks, first of all in relation to *content* and secondly to *style*. The two aspects that are compared are their performances *without*, as opposed to *with* TREAT. Each pair of dark/light blue bars represents the performance of one student from the second group (G2). The dark blue bar signifies his/her performance in the first translation task, while the light blue bar indicates the student's average performance in the subsequent translation tasks.

Since content is a better predictor of accurate comprehension than style, the fact that participants made more progress with regard to the former element is encouraging.

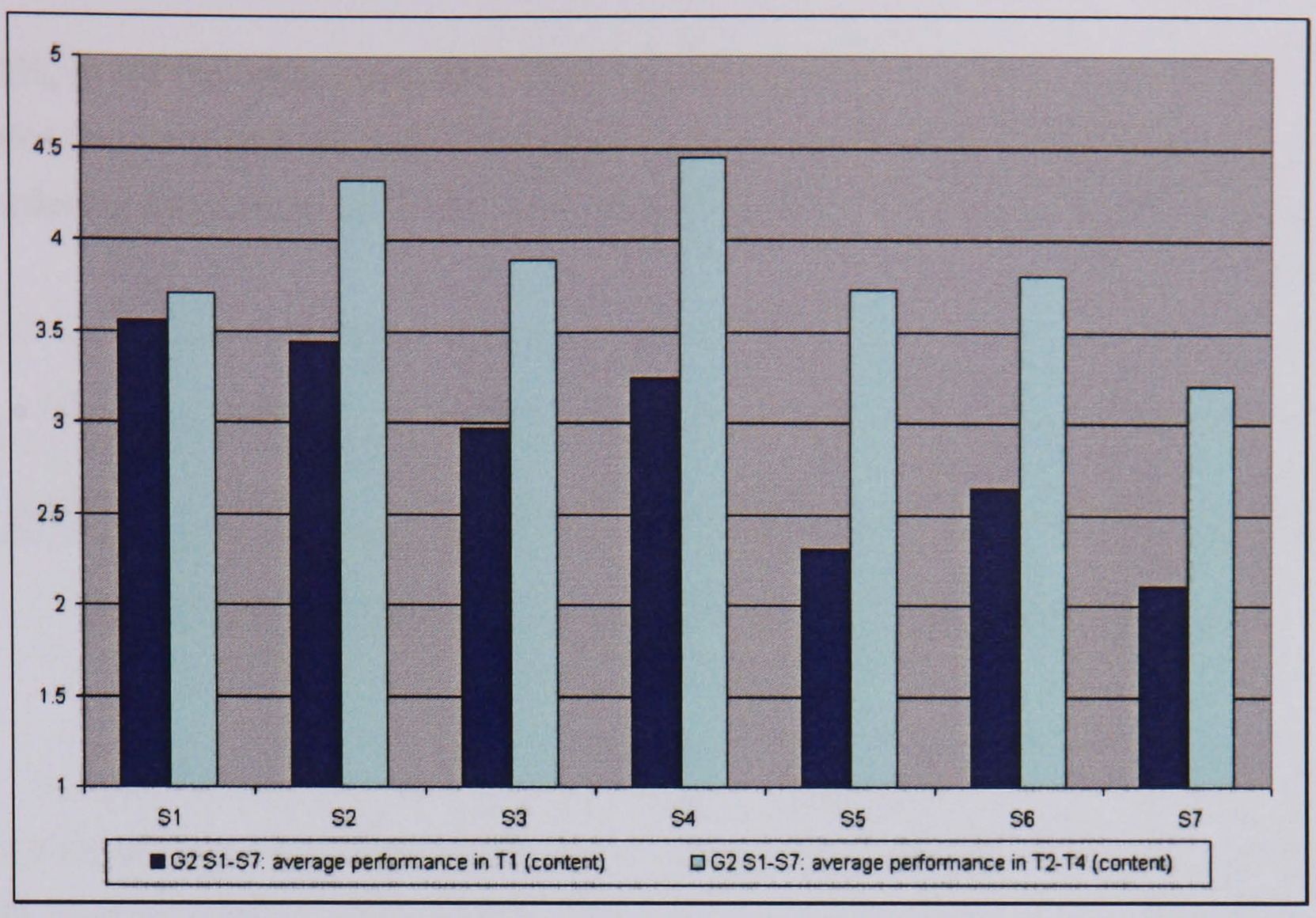

Figure 16: G2 students' individual performances for *T1* compared to *T2-T4* (content)

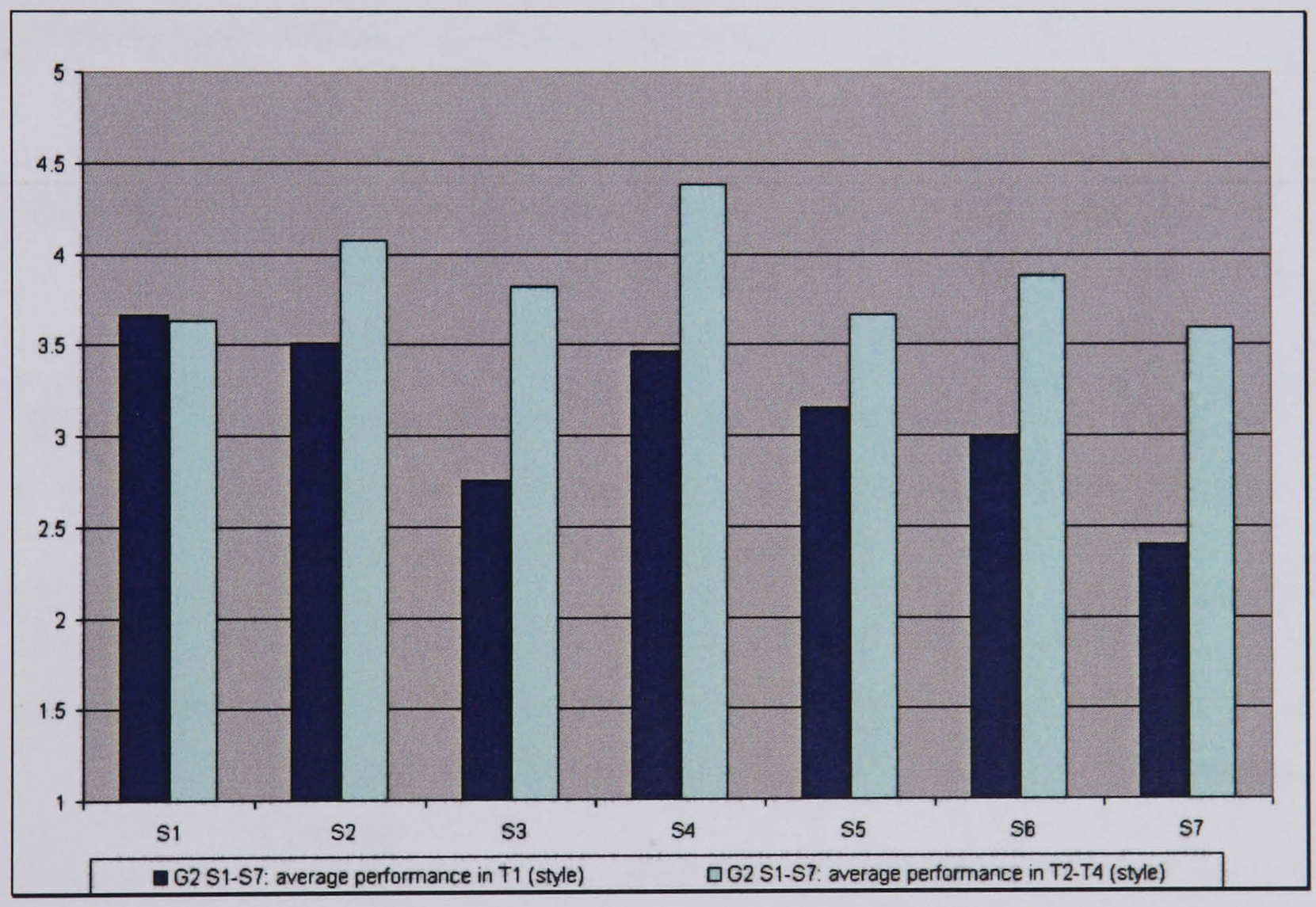

Figure 17: G2 students' individual performances for *T1* compared to *T2-T4* (style)

Moreover, **Table 3** presents the individual progress that the MA students (**S1..7**) in G2 made in rendering correctly the content of L3 source segments into L1 once they had TREAT as a resource. The percentages in this table represent the difference between the individual average scores at the end of *T1* and the individual average scores at the end of *T2-T4*. Although in one case the progress is of only

3.82%, in all the other cases the difference exceeds 20%, going up to 35.53%. These figures indicate that all users benefited from using TREAT, a fact which was also recorded in their answers to the final questionnaire – see section 6.5 for more details.

S1	S2	S3	S4	S5	S6	S7
3.82%	22.08%	22.99%	30.14%	35.53%	29.10%	27.55%

Table 3: G2 individual student progress in translation tasks (content)

Numerous errors in the first translations produced by G1 students were caused by the miscomprehension of L3 function words, for which no WordNet information could be provided, and for which STTs in L1 and L2 were often misleading. One such example is presented in **Table 4**. In this example, the L3 conjunction *şi* was erroneously translated as *if* – which is the translation of the L2 conjunction *si* - instead of being translated with the L1 *and.*

L3 original	*Ambasadorul Uniunii Europene la Bucureşti Jonathan Scheele a declarat că în chestiunea adopţiilor internaţionale, prioritare sunt drepturile copiilor* ***şi*** *nu interesele cetăţenilor străini.*
Gloss	*EU ambassador in Bucharest, J.S. stated that, in the matter of international adoptions, the rights of children are the priority* ***and*** *not the foreign citizens' interests.*
User translation	*The European Union Ambassador in Bucharest Jonathan Scheele has said that in the International Adoption affair, priorities are the rights of children* ***if*** *not the interests of foreign citizens.*

Table 4: Mistranslation of the L3 function word *şi* (*and*)

Identical mistakes were also made by the participants in G2, as well, who had support from on-line glossaries for the first translation task. However, over the following 5 sessions which involved TREAT, this second group of learners used the project resources and identified the true meaning of many L3 function words. **Table 5** shows that users were able to surpass the challenge represented by dealing with the L3 conjunction *şi* which looks cognate with the L2 *si*, and which occurs in the same

contexts as both its erroneous L1 translation (*if*) and the correct one (*and*): *SENTENCE* ***şi/si/if/and*** *SENTENCE*:

L3 originals	*Premiera filmului a avut loc la Berlin* ***şi*** *a dat naştere unei controverse de proporţii.*
Gloss	*The film premiere took place in Berlin* ***and*** *sparked major controversy*
Users' performances	*The film had its premiere in Berlin* ***and*** *has started a controversy of epic proportions.*
	The premiere of the film took place in Berlin ***and*** *gave rise to widespread controversy*
	The film's premiere took place in Berlin, causing great controversy.
	The film premier took place in Berlin ***and*** *caused a lot of controversy.*

Table 5: Correct translations of the L3 function word *şi* (*and*)

There are other examples of Romanian function words that misleadingly seem cognate with French function words, and appear in similar contexts, which makes the disambiguation process more challenging:

L3 (L1 equivalent)	*L2 (L1 equivalent)*
ca (as)	ça (this)
ce (what)	ce (this)
ci (but)	-ci (this), ici (here)
la (at)	la (the)
pe (on)	peu (little) – in this case the cognate L2 word is not a function word, but an adverbial (a content word)
ne (to us)	ne (not)

Table 6: L3 function words (L3-L2 false cognates)

This evidence proves that it is advisable that words be of a certain length before the string similarity algorithm is run. Function words tend to be small in size and the accuracy of the algorithm is significantly decreased when working with them. As a result, future versions of TREAT will have a minimum length threshold below which words will not be considered for string similarity.

6.4.2 Performance in reading comprehension tasks

'Reading for general comprehension is, in its most obvious sense, the ability to understand information in a text and interpret it appropriately' (Grabe & Stoller, 2002:17). The participants were required to perform text summarisation tasks, as well as scan and skim texts for information mainly since such activities are increasingly expected of translators.

Figure 18 shows that there was an improvement in the quality of G2's summaries when they used TREAT (lessons 2-6 – Les2-Les6) compared to the first summary produced without any assistance from the CALL environment (lesson 1 – Les1).

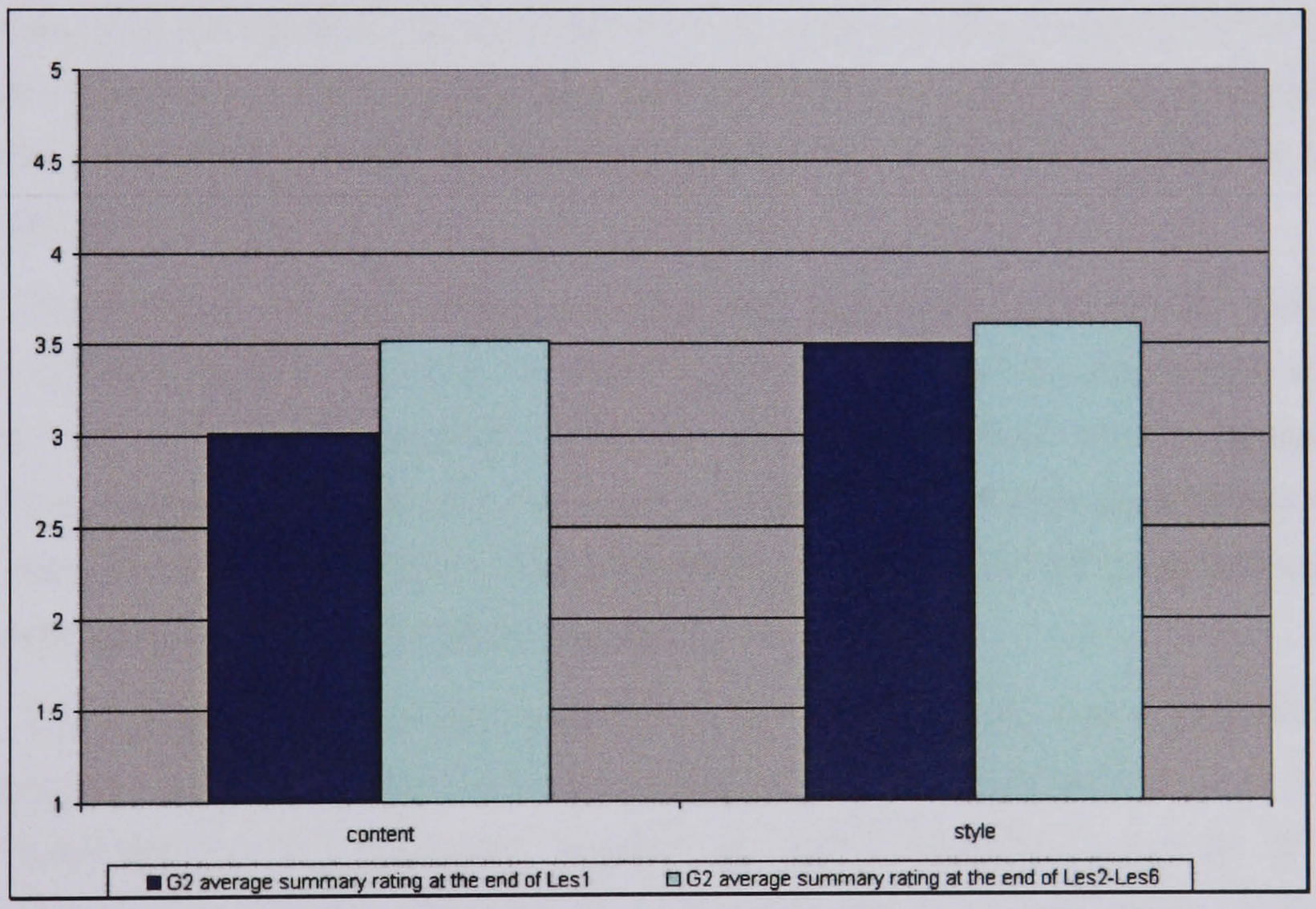

Figure 18: G2 performance in the summarisation tasks

6.4.3 Performance in morphology-related tasks

The participants were required to complete a number of tasks aimed mainly at motivating them to use the TREAT query engine in order to notice salient features of the L3 morphology. They worked on L3 noun, verb and adjective morphology, and the performance of those who completed the tasks with the help of TREAT was

significantly better than that of people working with the currently available L3 learning resources.

Appendix 1 presents a comparison of the performance of G1 and G2 in the first set of tasks dealing with noun morphology – once again, for this task, unlike G2, G1 used TREAT. The participants were required to translate a number of nouns from L1 into L3, namely *right, the right, rights, the rights, child, the child, children, the children, citizens, the citizens, of the citizens*. The motivation for this task was to see how the learners cope with certain L3 morphological features that are quite different from both the L1 and L2. For instance, definiteness is achieved in L1 and L2 with the help of definite articles – *the* and *la/le/les* respectively – that precede the noun. In Romanian, in contrast, definiteness is achieved by attaching various morphemes – *clitics* - to the end of the noun, depending on its gender and number – e.g. *-a/-ul/-i/-le*. Moreover, the genitive is formed in a similar manner in Romanian, by attaching morphemes such as *–lui/-ei/-lor* at the end of the noun.

These different morphological realities are likely to be very difficult to pick up, especially during the first encounter with an unknown L3, yet the TREAT query engine helped G1 achieve the average score of **82.95%**, while the freely-available materials used by G2 could not get them beyond the **50%** mark in twice as much time as G1.

These results are encouraging and they can represent a good starting point for more detailed studies focusing on specific issues, such as the acquisition of the plural and definiteness markers, genitive and prepositional phrase formation, adjective degrees of comparison, the passive voice, noun and verb declensions, or of verb tenses in the L3, to follow. The experiment touched on all of these aspects and the users performed in a satisfactory manner.

The experiment also demonstrated that, even though tasks can be very challenging – their complexity would normally preclude dealing with them in 5 two-hour language-teaching sessions – learners can tackle and often solve all of them without losing motivation, if they perceive the authenticity and relevance of the task (Seidlhofer and Bernardini in Aston, 2000:15). All the tasks started with an analysis of L3, L2 and L1 authentic reading materials which were subsequently used for translation, summarisation, scanning and skimming tasks. As a result, the strong relationship between such tasks and the acquisition of sound knowledge of the L3 morphology was clear for all the participants.

6.5 Results of the user survey

> 'Learners can also act as contributor to design (Levy 2002, 75), as observed guinea pigs (Allen 1997, 450) or as researchers and experimenters (Rüschoff 1993, 10). Learners have to be involved (Hémard 1999, 225-26; Spratt 1999, 141) to express their views on content authoring, the quality of the interface, the role of the computer, the meaningfulness of user-system interaction, preferred learning strategies and activities, effective language learning methods, etc. Sometimes significant discrepancies between learners and their teachers or syllabus experts considerably hamper learning (Spratt 1999, 142).' (Colpaert, 2004a:110)

Research in CALL, NLP, SLA/TLA and CL informed my initial hypotheses together with the design of M3RM and its implementation into TREAT. Yet it was the interaction with the students that refined it. Learners were never considered guinea pigs; on the contrary, the introductory sessions provided details of the architecture of TREAT because it was believed that, as participants in the experiment, the students would benefit a lot from knowing how the environment operated. This also contributed to maintaining a high level of motivation on their part, as they became more involved and not only carried out the set tasks, but occasionally experimented new avenues using TREAT, and then offered useful feedback. Apart from informal discussions, an organised survey of the users' experience with the learning environment was conducted at the end of the experiment – nevertheless, changes to the interface were also implemented during the evaluation period, the most important ones being reducing the number of windows, restructuring the information which G1 users needed to access in stand-alone installations of TREAT, reducing the waiting time when using the TREAT query engine, and porting everything to a web-based environment accessible off-campus, all of which G2 users appreciated. Appendix 3 contains the full questionnaire.

The analysis of responses revealed that all the users:

- thought that the approach, as well as TREAT, were original and motivating
- believed that the approach was suitable to teach professional translators to read in a foreign language

- analysed thoroughly the L3 linguistic information provided by the TREAT query engine
- had used their L2 when working on the set tasks
- would be willing to use this approach in conjunction with other course materials to learn other foreign languages

Moreover, the majority of users:

- would recommend this approach for learning to read in a foreign language
- believed the approach useful for university students and academics
- changed their initial attitude towards the L3 into a more favourable one
- thought that it is possible to improve three languages at the same time by using an environment such as TREAT
- found the interface and resources useful
- found TREAT very easy to use and easy to become familiar with (the rest found it relatively easy to use)
- found the L3, L2 and L1 SRAs useful and relatively useful, and consulted them occasionally
- found the concordance engine relatively useful (the rest of the users, however, stated that they found it useful)
- analysed the L1, L2 and L3 concordance lines very often
- found the L2 SSTs relatively useful
- believed they had acquired knowledge of the L3 grammar and morphology
- thought they had improved their command of L2 to some extent

Finally, a minority of users (40%):

- used the TREAT article selection criteria to find texts that better suited their preferences
- used the concordance engines to look up L1 or L2 words, too. An analysis of the log file containing the tokens looked up by G2 indicates

that the searches for L1 and L2 tokens represent only 7.43% and 2.94%, respectively, of all queries.

The participants also indicated that the accuracy of the automatic identification of structurally-similar L2 tokens needed to be improved, as it was occasionally misleading, especially in the case of function words, for which no coverage was provided by the WordNets. Moreover, they reported that the article selection criteria appeared sensible and useful, and that they would be interested in working with them more closely in the future.

Overall, apart from performing well in the set tasks, the users remained motivated and interested by learning to read in an unknown L3. When asked what they would do differently when they went back to using TREAT, one user stated the following: 'Less emphasis on performing tasks, or on translation; more emphasis put on simply reading and understanding, using the related articles according to my own interests.' It is encouraging to see evidence of interest from future translators in expanding their portfolio and in using the languages they know already for that purpose. Moreover, it would be interesting to analyse how learners benefit from M3RM when no tasks are set.

Future implementations of TREAT will have the following features:

- larger corpora
- more complex language resources – e.g. WordNet's for all the languages involved in the project
- an improved cognate identification mechanism which does not deal with function words (provided the cognate languages use the same script)
- an improved query mechanism, which allows users to search for phrases, not only words, and use wildcards – this functionality will prove particularly useful for acquiring salient morphological features of the target language
- a larger set of text-selection criteria – involving word frequencies, too
- an improved display mechanism which highlights target words automatically in the articles presented in their native formats, and which makes the text-selection criteria more transparent for users (e.g. if the user wants to read the article with the highest frequency of nouns in the corpus, all these nouns will be highlighted when opening the article)

- adaptive user-tracking mechanism, capable of generating exercises automatically and suggesting related issues to be explored based on what the learner has already looked at.

7 Conclusions

7.1 Implications of results

To my knowledge, there have been very few studies so far into the possibility of helping adult learners acquire reading skills in a foreign language (L3) which is related to a second language (L2) they know to some extent – see section 4. Moreover, these studies did not create effective reading models by combining second and third language acquisition (SLA/TLA), computer-assisted language learning (CALL), corpus linguistics (CL) and natural language processing (NLP) research, despite certain CL techniques – mainly concordancing - being increasingly popular with language tutors. Nor did these studies implement innovative methodologies in dynamic, multilingual and scalable CALL environments, tested afterwards in real scenarios and improved following the users' feedback.

Given the nature of the topic – L3 acquisition - and the large number of language tutors interested in it, there is anecdotal evidence to suggest that adding an L3 may not pose too many problems once the user is familiar with a related second language (L2). However, hardly any effort has been invested in developing new approaches to optimise this language acquisition process. My study highlights the fact that, although linguists are quite capable of acquiring other languages by using their existing knowledge, they can do so more quickly and reliably if they have access to multilingual resources assembled, processed and delivered in a sensible and appealing manner without excessive effort from the part of course designers. There is, therefore, a great opportunity to build on the work of specialists in the fields of CL, NLP, CALL and SLA/TLA in order to develop more specialised language courses aimed at specific audiences and needs - instead of the numerous media-rich, all-purpose materials currently marketed.

The main original contributions of my project are the design and development of a **multilingual resource-rich reading model (M3RM)**, as well as its implementation in a CALL environment - **TREAT**. M3RM represents a forward step in the fields of SLA/TLA. It is more complex than the latest proposed model – that of *condensed reading* (Gabrielatos, 2005) –, it addresses numerous concerns expressed in the literature – from the search for an effective approach to increase the reader's background knowledge to the non-intrusive provision of lexical and morphological assistance on demand. It is also, to my knowledge, the first reading model that has been tested and proven in pilot studies to support the acquisition of multilingual knowledge.

Of significant importance is the use of multilingual **comparable** textual resources to achieve the project goals – the term *comparable* refers to texts originally written in different languages, but on the same/similar topic. To my knowledge, this type of corpora have not been used in language teaching scenarios in bilingual settings, let alone trilingual ones. The general practice has been to present learners with short – and often artificial – bilingual **parallel** resources – that is, a source text and its translation. Only in translation studies classes have comparable texts become more popular in recent years in order to expose trainees to authentic language usage, and thus increase their chances of producing accurate, as well as naturally-sounding and linguistically-appropriate target texts.

One of the immediate implications of using M3RM is that course designers no longer need to spend significant time looking for – or producing themselves – parallel texts that often show interference of source language and culture, and are likely to offer learners the translator's interpretation of the source text rather than a first-hand account of the events in question. Except for corpora of literary works or official documents that already exist in several languages, trainers or trainees themselves would have little chance of assembling multilingual parallel corpora that are big enough to present learners with numerous instances of authentic usage of particular words/phrases. However, automatic tools for assembling comparable corpora have recently become available, so the task of compiling relevant materials has become even easier.

A second important original contribution is that, by using L2 materials alongside L1 and L3 ones, users can improve their command of their second language, as well as identify links between L1, L2 and L3. Although no CALL environment to date has integrated three languages due, on the one hand, to the absence of a sound methodology to guide it and, on the other hand, to reservations about potentially subjecting users to cognitive overload, my experiment indicates that users appreciate having access to relevant multilingual materials. Furthermore, at the end of the study, the majority of participants reported having improved their L2 to some extent in the process of acquiring knowledge of the L3.

To summarise, by combining the latest research in SLA/TLA – section 2 –, with CL and NLP - section 3 - as well as by building on related projects that preceded this one – section 4 - I succeeded in formulating an innovatory reading model – sections 1.3.4 and 5.2. This model was also implemented in a web-based CALL environment – TREAT – which was improved following users' feedback. Finally, a small-scale experiment was conducted in order to see if M3RM was viable both in terms of the users' performance in a number of tasks – sections 6.2 and 6.4 –

and in terms of their perception of the value of my methodology and its practical implementation – section 6.5.

The initial hypotheses - described in section 1.3.1 – were confirmed. First of all, the experiment showed that TREAT, a CALL environment built using the latest NLP techniques and relying on multilingual comparable corpora – described in section 5.2.4 - can be more efficient than traditional language instruction for assisting learners in acquiring reading skills in an unknown L3 which is cognate with an L2 they know to some extent. In no more than 5 sessions during which learners relied on the materials presented through TREAT, they improved their performances in translation tasks by up to 35.53% - see section 6.4.1 for more details. It was also demonstrated that corpus-based language learning can be taken safely beyond the concordance stage; current NLP tools can be used for more than showing key words in contexts, though this application is nevertheless useful and appreciated by students. The combination of existing tools and locally-developed ones enabled the clustering of multilingual related texts, as well as the deployment of a multilingual query engine with enhanced functionalities.

Secondly, although they did not receive any explicit instruction regarding the L3 grammar and lexis, and therefore they had to rely only on the resources produced automatically from multilingual corpora – such as multilingual concordance lines, collocation and frequency information, structurally-similar tokens, and related articles in all project languages - the experiment indicated that TREAT users made significant progress in the acquisition of salient features of L3 morphology – see section 6.4.3 for more details. An interesting aspect is that, although NLP tools are not 100% accurate – therefore learners using TREAT came across inaccurate POS and lemma information - they used the wide range of authentic materials at their disposal to identify and correct misleading information. The results of the experiment therefore endorse the argument that, given enough motivating resources, students can correct erroneous hypotheses and inferences even when their knowledge of the target language is still low – section 2.3.1.1.1.2.1.

Thirdly, it was demonstrated that multilingual reading resources can be arranged automatically in multilingual clusters which are beneficial for expanding the learners' background knowledge about particular topics – see section 5.2.3.1.

Fourthly, M3RM supported participants in activating and improving their L2 knowledge – section 6.5 indicates that the majority of users believed they had improved their L2 to some extent while using TREAT.

Finally, I have also demonstrated that, in an era when a lot of effort goes into transposing traditional language teaching resources onto complex online

environment that rely heavily on multimedia despite significant research pointing to its adverse effects – see section 3.3 - effectiveness can also be achieved through simplicity. The authenticity and variety of the project multilingual textual resources, as well as the innovative way of linking them and making them available according to the users' individual needs, were all appreciated by the learners –section 6.5 – and helped them achieve rapidly the main goals with which they agreed to take part in the experiment – section 6.4.

7.2 Further research questions

Due to the unavailability of more users for longer periods of time, it was not possible to conduct a large-scale evaluation experiment of M3RM and TREAT. Consequently, though the results are encouraging, I am guarded about generalising them. I believe that more complex experiments would generate more conclusive statistics about the usefulness of M3RM and TREAT for acquiring reading skills in a foreign language.

Although the tasks set for the participants included elements of L3 translation, reading comprehension, as well as L2 and L3 morphology, the main focus was on evaluating the users' performance in the translation tasks. In this area, the figures presented in section 6.4.1 show that the learners who had access to TREAT made significant progress in only 5 sessions.

Nevertheless, there are numerous aspects related to the acquisition of reading skills in a foreign language in a multilingual, corpus-based environment that deserve being investigated more systematically. One topic of research is the detailed analysis of the activation of both lower and higher-level processes when reading in an environment built on M3RM - lexical access (word recognition), syntactic parsing, semantic proposition formation and working memory activation on the one hand; and the text model of comprehension, situation model of reader interpretation, background knowledge use and inferencing, and executive control processes on the other (Grabe & Stoller, 2002:20).

The experiment touched on the development of automatic word recognition skills, namely the acquisition of

- plural and definiteness markers
- genitive and prepositional phrase formation
- adjective degrees of comparison
- the active and passive voices
- noun and verb declensions

- verb tenses.

I also evaluated the performance of participants when using certain reading strategies in the multilingual, corpus-based environment – namely summarising information, making inferences, and guessing the meaning of new words from context. Initial results indicated rapid progress in mastering these strategies when using TREAT, yet the list is longer (Grabe & Stoller, 2002:16) and the opportunities for research numerous.

The speed with which learners become autonomous readers in the L3, as well as the precise extent to which their command of the L2 improves after adopting M3RM, are also viable research questions. It would also be interesting to assess their performance when dealing with texts where the WordNet/SST content word coverage ratio is reversed – in the experiment, the balance was clearly in favour of the WordNets.

One could also compare the effectiveness of the *condensed reading* model with that of M3RM.

Furthermore, as some participants in the experiment already indicated, assessing their behaviour and rate of L3/L2 acquisition when no set tasks are present and they are engaged in individual discovery could also be helpful for the SLA/TLA research community.

M3RM should be applied to other pairs of L2-L3 cognate languages, too. TREAT can be optimised to support corpora of any size, multi-word queries and system feedback to users, so it is likely that effective language courses aimed to help adults acquire reading skills in foreign languages could be implemented in less time and with more success than the currently-fashionable complex multimedia applications.

Additional research can be devoted to finding alternative free resources to be used in such CALL environments. For instance, experiments were carried out in this project using freely-available lists of L1-L2 true cognates, as well as a string-similarity algorithm – see section 5.2.2. This approach proved to be effective, resulting in users being provided with L2 support which they often found useful.

Should the cognate-identification algorithms be improved sufficiently, it would be interesting to evaluate the accuracy of the related-article identification mechanism that no longer uses any WordNet or dictionary support, but only automatically-identified cognates across languages.

Finally, if it is proven that the demand for multimedia content far exceeds that for environments such as TREAT in its current form, another ambitious – yet

plausible – research question would be the possibility of using voice-recognition software together with M3RM in order to identify related resources in a multimedia environment and deploy them in a CALL system based on TREAT, but with added multimedia features and support.

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Appendices

Appendix 1

TASK: Find the Romanian equivalents of the following English words and phrases (the wrong answers are highlighted in yellow; notice the group labels: G1-G2, and the student labels: S1-S8) – unlike G2, G1 completed this task with the help of TREAT:

L1 word/phrase	**L3 equivalent**	**G1**								**Overall percentage**
		S1	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**	
right	drept	dreptul	drept	drept	drept	drept	drept	drepturile	drept	
the right	dreptul	dreptului	dreptul	dreptul	dreptul	dreptul	dreptul		dreptul	
rights	drepturi	drepturi	drepturi	drepturi	drepturi	drepturi	drepturi	drepturi	drepturi	
the rights	drepturile	drepturile	drepturile	drepturile	drepturile	drepturile	drepturile		drepturile	
child	copil	copil	copil	copil	copil	copil	copil	copil	copil	
the child	copilul	copilul	copilul	copilul	copilul	copilul	copilul		copiii	
children	copii	copii	copii	copii	copii	copii	copii	copii	copiilor	
the children	copiii	copiii	copiii	copiii	copiii	copiii	copiii		copiii	
citizens	cetățeni	cetățenii	cetățeni	cetățeni	cetățenii	cetățeni	cetățeni	cetățenilor	cetățeni	
the citizens	cetățenii	cetățeni	cetățenii	cetățenii		cetățenii	cetățenii		cetățenii	
of the citizens	cetățenilor	cetățenilor	cetățenilor	cetățenilor	cetățenilor	cetățenilor	cetățenilor		cetățenilor	
SCORE		**63.64%**	**100.00%**	**100.00%**	**81.82%**	**100.00%**	**100.00%**	**36.36%**	**81.82%**	**82.95%**

L1 word/phrase	L3 equivalent	G2								Overall percentage
		S1	S2	S3	S4	S5	S6	S7	S8	
right	drept	drept	drept	dreptur	drept	drept	dreptul	drept	drept (?)	
the right	dreptul	dreptul	dreptul	dreptur	dreptul	dreptul	Au drepturi	dreptul	dreptul	
rights	drepturi	drepturi	drepturi	drepturi	dreptil	drepturi	drepturile	drepturi	drepturi	
the rights	drepturile	drepturile	drepturile	drepturile	dreptilor	drepturile	drepturile	drepturile	drepturile	
child	copil	copil	copi	copil	copil	copil	copil	copil	copi (?)	
the child	copilul	copilul	copul	copii	copila	copii	copil		copiul ? copilor ?	
children	copii	copiii	copii	copiil	copili	minorii	copiii	copii	copiii	
the children	copiii	copiiile	copiile	copiilor	copiilor	copiilor	copiii	copiii	copiilor	
citizens	cetățeni	cetățenii	cetățenii	cetățen	cetățean	cetățenii	cetățean	cetățenii	cetățenii	
the citizens	cetățenii	cetățeniile	cetățenile	cetățenil	cetățenii	cetățenilor	contează	cetățenii		
of the citizens	cetățenilor	cetățenilor	cetățenilor	cetățenilor	cetățenilor	cetățenilor	contează	cetățenilor		
SCORE		**63.64%**	**54.55%**	**36.36%**	**45.45%**	**54.55%**	**27.27%**	**81.82%**	**36.36%**	**50.00%**

Appendix 2

HTML forms created for independent reviewers to evaluate the performance of our users

Form 1

Please rate from 1 to 5 (1=lowest and 5=highest) how well the translations express the content of the gloss (content) AND how natural their wording is (style)

Q1: Gloss: EU ambassador in Bucharest, J.S. stated that the rights of children are more important than foreign citizens' interests when it comes to the issue of international adoptions

	Translation	Content	Style
1	The ambassador of the European Union in Bucharest, Jonathan Scheele, has declared that with the question of international adoption, the priority should be the rights of the children and not in the interests of foreign citizens.	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
2	The Ambassador to the European Union from Bucharest, Jonathan Scheele has stated that on the question of international adoptions, priority will be the right of children if no interest a foreign citizen.	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
3	The European Union Ambassador in Bucharest, Jonathan Scheele, declares that the rights of children are priority	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
4	European ambassador to Bucharest, Jonathan Scheele, has announced that in the issue of international adoption the rights of children take precedence over the interests of foreign citizens.	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

5	The European ambassador in Bucharest has declared that the international adoption in issue prioritises the rights of the children and not of the interests of foreign citizens.	◉ 1 ○ 2 ○ 3 ○ 4 ○ 5	◉ 1 ○ 2 ○ 3 ○ 4 ○ 5
6	The Bucharest European Union ambassador Jonathan Scheele declared that the international issue is now to give priority to child rights over the citizenship of foreigners.	◉ 1 ○ 2 ○ 3 ○ 4 ○ 5	◉ 1 ○ 2 ○ 3 ○ 4 ○ 5
7	The European Union ambassador in Bucharest Jonathan Scheele has said that in cases of inter-country adoption, the proiority is children's rights, and not the interests of foreign citizens.	◉ 1 ○ 2 ○ 3 ○ 4 ○ 5	◉ 1 ○ 2 ○ 3 ○ 4 ○ 5
8	The Ambassador of the European Union Jonathan Scheele has announced that with regards to international adoption laws the rights of the adopted children (---) are a priority	◉ 1 ○ 2 ○ 3 ○ 4 ○ 5	◉ 1 ○ 2 ○ 3 ○ 4 ○ 5

Q2: Gloss: The rights of the Romanian children are the priority

	Translation	Content	Style
1	The rights of Romanian children are priority	◉ 1 ○ 2 ○ 3 ○ 4 ○ 5	◉ 1 ○ 2 ○ 3 ○ 4 ○ 5
2	The rights of Romanian children come first	◉ 1 ○ 2 ○ 3 ○ 4 ○ 5	◉ 1 ○ 2 ○ 3 ○ 4 ○ 5
3	The rights of Romanian children are priority	◉ 1 ○ 2 ○ 3 ○ 4 ○ 5	◉ 1 ○ 2 ○ 3 ○ 4 ○ 5
4	The rights of Romanian children are our priorities	◉ 1 ○ 2 ○ 3	◉ 1 ○ 2 ○ 3

		☐ 4 ☐ 5	☐ 4 ☐ 5
5	The rights of Romanian children come first	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
6	Romanian Children Have the Right of Priority	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
7	The right of Romanian citizens are the priority	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
8	Priority is given to Romanian child rights.	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Q3: Gloss: Parliament adopts the legislation on adoption

	Translation	Content	Style
1	Parliament has adopted something	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
2	The Parliament has accepted the adoption law.	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
3	Parliament has decreed legislation for adoption	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

4	Parliament adopted the legislation	◉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	◉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
5	Parliament adopt law on adoption	◉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	◉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
6	Parliament has passed legislation on adoption	◉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	◉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
7	Parliament has passed adoption bill	◉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	◉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
8	Parliament adopts law on adoptees	◉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	◉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Q4: Gloss: Alliance between România Mare Party and BNC generates controversy

	Translation	Content	Style
1	Pact between the Romanian loyalty party and the National Syndicate Block of disgruntled treasurers	◉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	◉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
2	Agreement between the Greater Romania Party (PRM) and the National Trade Union Bloc causes displeasure.	◉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	◉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
3	Pact between the Great Romanian Party and the National Sidicate Block causes dissatisfaction	◉ 1 ☐ 2 ☐ 3	◉ 1 ☐ 2 ☐ 3

		☐ 4 ☐ 5	☐ 4 ☐ 5
4	Pact between the Romanian Mare party and the National Unions Movement is frowned upon.	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
5	The pact between the party of Romania and the national syndicates has not won a majority	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
6	Agreement between Great Party of Romania and National Trade Union bloc causes upset	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
7	PRM and BNS make pact and wake something	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Q5: Gloss: British press about the Romanians that live in sewers

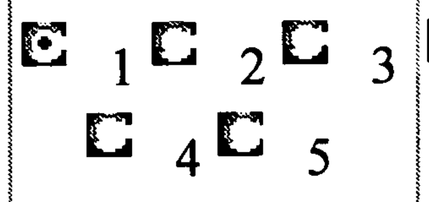
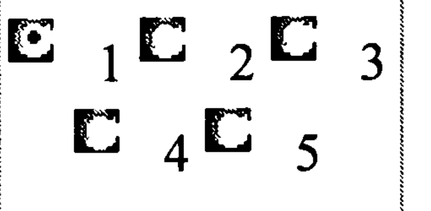
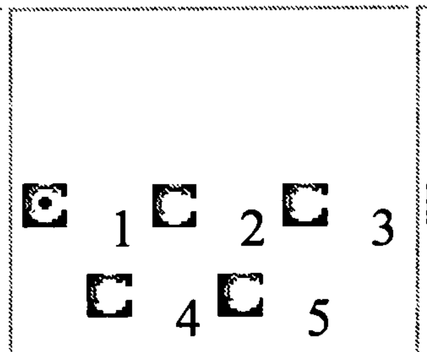
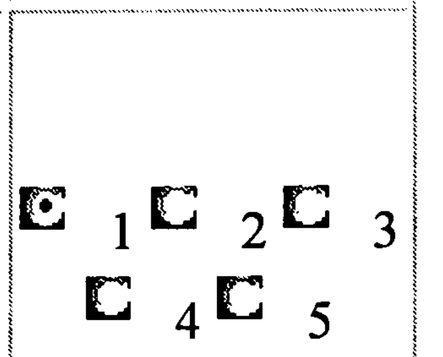
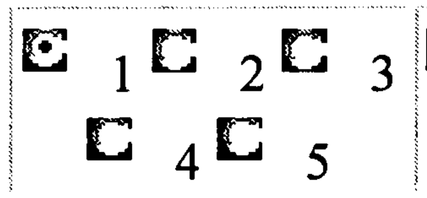
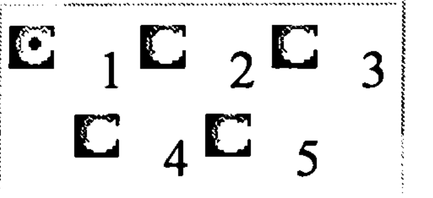
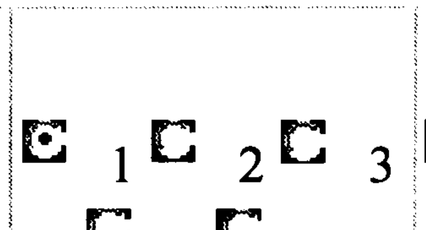
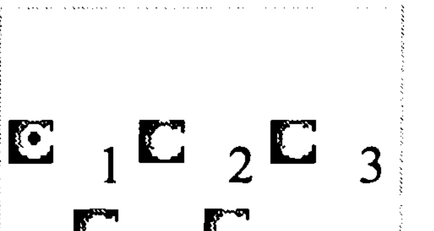
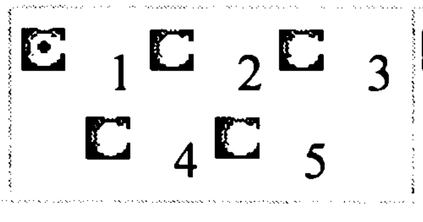
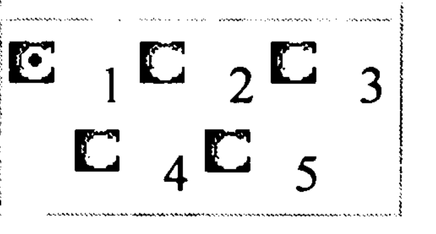
	Translation	Content	Style
1	something about Britons and romanians	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
2	British Romanians who live in channels	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
3	British press on Romanians living in a ditch	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

4	The British press is influencing Romanian press?	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5
5	British Press about romanians who rely on the gutter	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5
6	British press reports on Romanians who live in the channel	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5
7	The British press writes about a Romanian who lived in a canal	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5
8	British press on Romanian who lives in sewer (??)	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5

Please rate from 1 to 5 (1=lowest and 5=highest) how well the summaries express the content of the model (content) AND how natural their wording is (style)

Model: Two diamonds worth 11.5 mil euro were stolen from an antique and jewelry exhibition hosted by the Louvre, namely from the Chopard stand during the employee's lunch break; there were no victims; Cartier had put them up for sale: the bigger diamond was a 47-carat one worth 6 mil euro, the other was a 30-carat one worth 5.5 mil euro.

	Summary	Content	Style
1	The Louvre exhibited two diamonds worth 11.5 million euro together. Despite security cameras, they were stolen during the lunchbreak without the use of force. The biggest diamond was 47 carat and was worth 6 million euro; the second one was 30 carats, and worth 5.5 million	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5

	euro.		
2	The article is about the theft of two diamonds worth approx. €11 ½ million from an exhibition of jewellery from the Louvre in Paris. Police confirm that the precious stones were stolen during a 15 minute break. There seem to have been an alarm system and closed-circuit cameras in operation. There is not even a link to the security system of the main Louvre museum protecting masterpieces such as the Mona Lisa. The larger of the two diamonds was 47 carat and is estimated to be worth €6 million. The other diamond is 30 carat and is valued at €5.5 million. The owners of the diamonds, Cartier, are withdrawing the diamonds from the sale (?)		
3	A diamond worth 11.5 million euro has been stolen from an exhibition at the Louvre in Paris. Police said the precious stone was stolen during an employee's 15-minute break, in broad daylight and with no resort to violence. The showcase containing the diamond was not alarmed, due to the abundance of surveilance cameras. Police said that such a lapse of security is extremely rare. The biggest stone was a 47 carat jewel worth 6 million euro; the other, 30 carats, was worth 5.5 million euro.		
4	Diamonds worth approx 1.5million dollars have been stolen from the Louvre in Paris. It tells a bit about the security at the museum.		
5	It's about a diamond theft in Paris. The diamonds were worth in the region of 15million euro and were at an exhibition at the Louvre in Paris. It belonged to Chopard and was stolen in 15mins. There was a lapse in security because there were security cameras but didn't have an alarm. There isn't much security at Louvre which has works of art like the Mona Lisa. One diamond is 47 carats and worth 6 million euro. Cartier has something to do with selling the diamonds?		
6	Two diamonds worth 11.5 million Euro was stolen from the Chopard stand at an exhibition in the Louvre. There were cameras and a new security system in the museum which houses priceless art objetcs, such as the Mona Lisa.One of the diamonds was 47 carat and was worth 6		

	million, while the other, of 30 carats, was worth 5 million.		
7	Two diamonds that in total are worth 11.5 million euros have been stolen from an exhibition of jewellery from the Louvre Museum in Paris. They were stolen from the Chopard stand, in broad daylight, in a matter of 15 minutes, or so it is assumed. There were no alarm systems fitted, and the security system leaves a lot to be desired, most famously witnessed when the Mona Lisa was stolen. The biggest of the 2 diamonds is 47 carat and its estimated value is 6 million euros, whereas the other is 30 carat and its value is 5.5 million euros.	1 2 3 4 5	1 2 3 4 5
8	Two diamonds were stolen from the Louvre. Security needs to be improved. They were worth 15 million euros together.	1 2 3 4 5	1 2 3 4 5

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Form 2

Q1: Gloss: EU ambassador in Bucharest, J.S. stated that the rights of children are more important than foreign citizens' interests when it comes to the issue of international adoptions

	Translation	Content	Style
1	European Union ambassador to Bucharest Jonathan Scheele declared that in the international adoption issue, priority must be the rights of children, not foreign citizens.	⊙ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	⊙ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
2	EU ambassador in Bucharest, Jonathan Scheele, speaking about the proposed international adoption rights, has declared that the priorities are the rights of the children if not the interests of foreign citizens.	⊙ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	⊙ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
3	The European Union Ambassador in Bucharest Jonathan Scheele has said that in the International Adoption affair, priorities are the rights of children if not the interests of foreign citizens	⊙ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	⊙ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
4	The EU Ambassador from Bucharest, Jonathan Scheele, declared that there are problems with the international adoption as the EU States are not interested in prioritising children's priviledges.	⊙ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	⊙ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
5	The EU Ambassador in Bucharest, Jonathan Scheele, has declared that as regards international adoption, of greatest concern to foreign citizens is making children's rights a priority.	⊙ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	⊙ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
6	The EU Ambassador in Bucharest, J.S. has declared that in the matter of international adoption, the rights of the children are the priority where international citizens are concerned.	⊙ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	⊙ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
7	The EU Ambassador to Bucharest, Jonathan Scheele, has addressed the question of international adoption, the priorities being children's rights and the interests of foreign citizens.	⊙ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	⊙ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

8	The EU Ambassador to Bucharest, Jonathan Scheele, has declared about the matter of international adoption that the priority is the rights of children, not of foreign citizens.	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5

Q2: Gloss: The rights of the Romanian children are the priority

	Translation	Content	Style
1	Priorities are the rights of Romanian children.	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5
2	The priority is the rights of Romanian children.	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5
3	The rights of the Romanian children are the priority.	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5
4	The rights of Romanian children is the priority	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5
5	The priority is the rights of Romanian children.	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5
6	The rights of Romanian children are a priority.	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5
7	Romanian children's rights are the priority	○ 1 □ 2 □ 3	○ 1 □ 2 □ 3

		1 2 3 4 5	1 2 3 4 5
8	The rights of Romanian children are our priority.	1 2 3 4 5	1 2 3 4 5

Other translations:

	Gloss	Translation	Content	Style
1	Adoptions - the controversy continues	Adoption - the controversy continues	1 2 3 4 5	1 2 3 4 5
2	Child protection - between the government and criticism	Child protection - interim government is criticised	1 2 3 4 5	1 2 3 4 5
		Child protection - _____ government criticised	1 2 3 4 5	1 2 3 4 5
		Child protection - government are criticised	1 2 3 4 5	1 2 3 4 5
		Child protection - government criticised	1 2 3 4 5	1 2 3 4 5
		Child protection - interim government criticised	1 2 3 4 5	1 2 3 4 5
3	Minister Ioan Rus resigned	Minister Ioan Rus resigned	1 2 3	1 2 3

			☐ 4 ☐ 5	☐ 4 ☐ 5
		Minister Ioan Rus stands down	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		Minister Ioan Rus has quit	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		Minister Ioan Rus has resigned	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
4	Mircea Geoană: 'At the end of the negotiations with the EU, the sharks of our economy turn into dolphins'.	Mircea Geoană: The conclusion of negotiations with the EU - economic sharks become dolphins	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		M.G.: 'The final stage of negotiations with the EU, economic sharks become dolphins'	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
5	Finance minister criticises flat tax	Finance Minister promises lower taxes in 2005	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		United front on criticised tax policy of finance minister	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
6	Parliament has passed adoption legislation	Parliament has accepted adoption legislation	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		Parliament has adopted adoption legislation	☉ 1 ☐ 2 ☐ 3	☉ 1 ☐ 2 ☐ 3

			☐ 4 ☐ 5	☐ 4 ☐ 5
7	Mircea Geoană: I will have a big influence in the PSD (social-democrat party)	Mircea Geoană: The PSD have broken their main promise	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
8	The Finance Minstry promises lower taxes in 2005	The Finance Minister promises a budget in May 2005	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Please rate from 1 to 5 (1=lowest and 5=highest) how well the summaries express the content of the model (content) AND how natural their wording is (style)

	Model	Summary	Content	Style
1	This year's MTV awards were dominated by hip-hop. Outkast's 'Hey Ya' video scooped 4 awards, including best hip-hop video. Other winners are: rapper Jay-Z, No Doubt and Usher. British band The Darkness did not win anything.	Hip hop dominates MTV awards. Outkast picked up loads of awards. 'Hey Ya' won best hip-hop video	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
2	The leaders of the governing party PSD criticise the proposal of the opposition to introduce a 16% flat tax. Overall, the Romanian political parties support a decrease in fiscality.	Unique cost of taxing criticised by ministers	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
3	In an interview for the BBC, the leader of the opposition party PD, Traian Băsescu, argued that the governing party, PSD, are manipulating the Romanian anti-corruption institution - the PNA -, thus trying to reduce the influence of the	Traian Băsescu accuses the PNA of becoming an instrument of the PSD. The leader of the PD tells the BBC that he thinks the PNA has become a political instrument of the PSD.	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

	opposition before the November elections.			
4	Over 2 million Florida residents have been told to evacuate before the arrival of hurricane Frances on Saturday. The hurricane is larger than the state itself and the authorities have emphasised it greatly that nobody should ignore their warnings.	Hurricane Frances: 2 million people evacuated from their homes in Florida. J. Bush has declared state of emergency. The hurricane will arrive on Saturday in Florida.	1 2 3 4 5	1 2 3 4 5
5	The Romanian parliament has ratified the adoption legislation. The US government is unhappy because, under its final form, the Romanian adoption legislation prohibits international adoptions.Adoptions - the controversy continues	A debate about child protection laws	1 2 3 4 5	1 2 3 4 5
		Parliament adopt legal adoption. A new law has been introduced regarding adoption of Romanian children by foreigners.	1 2 3 4 5	1 2 3 4 5
6	Sergiu Sechelariu, state secretary in the Minister of Transport has resigned. He stated that he did this out of honour, loyalty and responsibility towards the current government.	Minister of Transport resigns	1 2 3 4 5	1 2 3 4 5
7	John Kerry accepted the nomination to run for presidency for the Democrats at the party's national convention. He promised to fight for a stronger America both at home and abroad. He strongly criticised Bush's decision to go to war in Irak. Both Edwards and Kerry are trying to use Kerry's bravery in Vietnam in order to win more votes, but it seems that the Republicans are getting stronger.	John Kerry's speech to the national convention - basically saying how good he is compared with Bush.	1 2 3 4 5	1 2 3 4 5

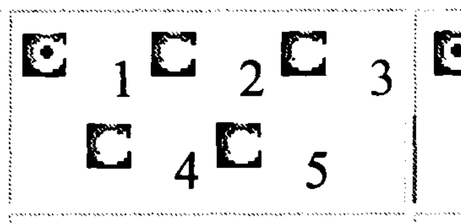
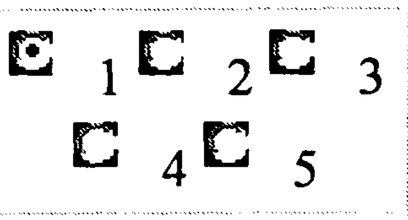
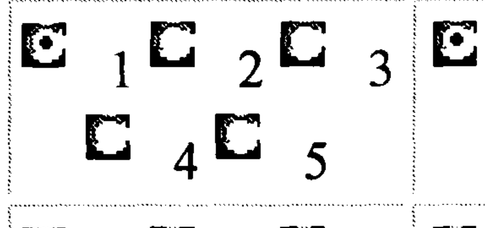
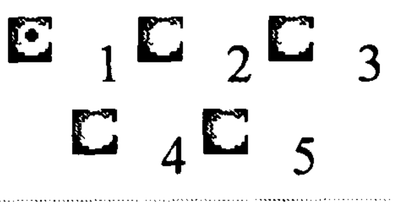
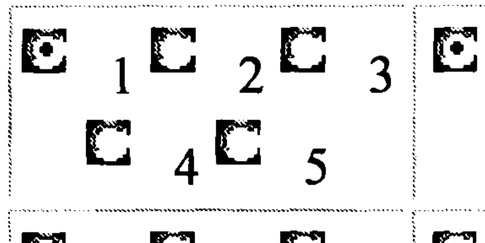
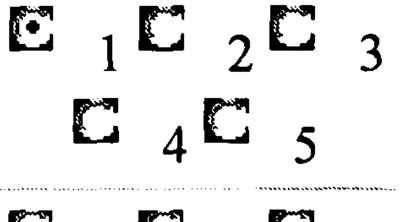
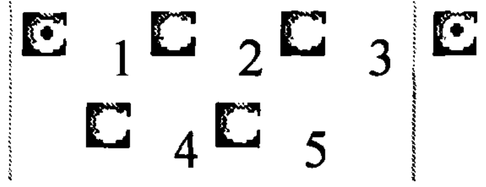
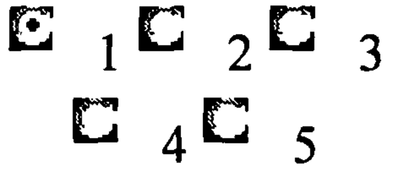
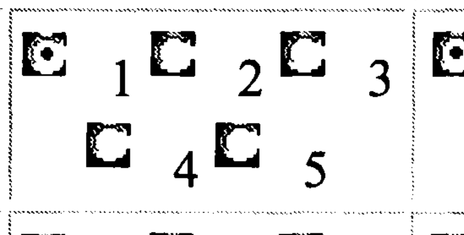
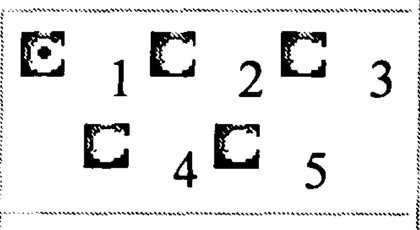
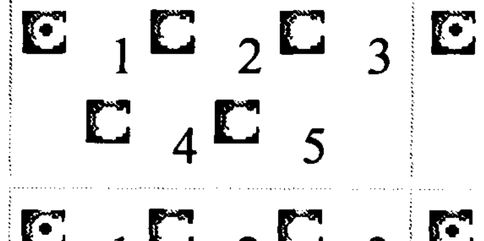
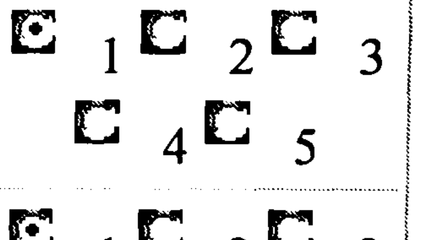
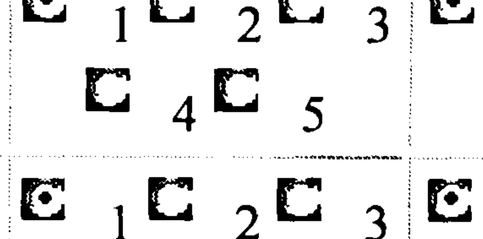
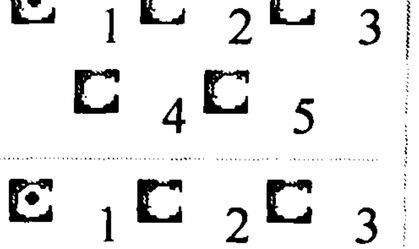
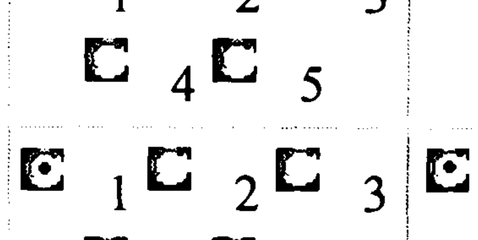
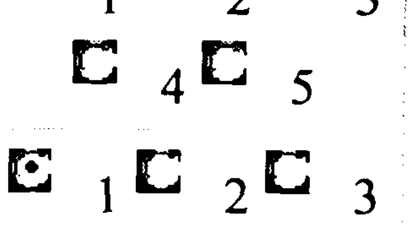
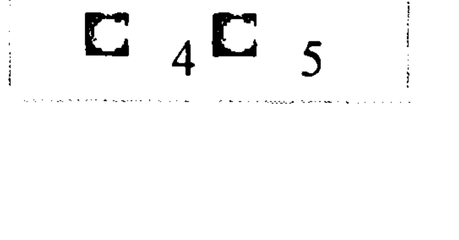
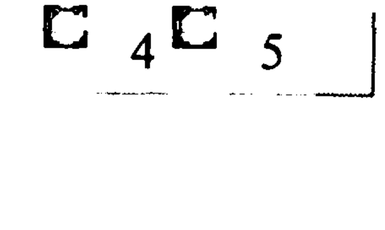
Form 3

Please rate from 1 to 5 (1=lowest and 5=highest) how well the translations express the content of the gloss (content) AND how natural their wording is (style)

	Gloss	Translation	Content	Style
1	Romanian achievements at the Cannes film festival	Romanian victories at the film festival at Cannes.	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		Victory for Romania in the Cannes Film Festival.	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		Romanian victory at the Cannes Film Festival	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		Romanian victories at the Cannes film festival	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		Romanian triumph/success at the Cannes film festival	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		Romanian victory at the Cannes Film Festival.	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		Romanian triumphs at Cannes film festival.	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

		Romanian Victory at Cannes Film Festival	1 2 3 4 5	1 2 3 4 5
2	Cătălin Mitulescu's film 'Trafic' has won the short movie Palme d'Or prize.	The film "Trafic" by Cătălin Mitulescu won the Palme d'or trophy for best short film.	1 2 3 4 5	1 2 3 4 5
		The film "Trafic" by Cătălin Mitulescu won the Palme d'or trophy for short film.	1 2 3 4 5	1 2 3 4 5
		The film Trafic by Cătălin Mitulescu has been awarded the Golden Palm in the short film category	1 2 3 4 5	1 2 3 4 5
		The Palme d'Or trophy has been awarded to Cătălin Mitulescu for the short film 'Trafic'.	1 2 3 4 5	1 2 3 4 5
		The film 'Trafic' by received the golden palm trophy painted shortly	1 2 3 4 5	1 2 3 4 5
		Cătălin Mitulescu's film 'Trafic' has won the Palme d'Or for best short film.	1 2 3 4 5	1 2 3 4 5
		The film "Trafic" by Cătălin Mitulescu took the Palme d'Or award for short film.	1 2 3 4 5	1 2 3 4 5
		Catalin Mitulescu accepted the Golden Palm award for his short film 'Trafic'.	1 2 3 4 5	1 2 3 4 5

3	Broken tabu	A taboo broken	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		Broken taboo.	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		A violated taboo	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		Breaking taboos	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		Verging on taboos	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		Breaking the taboo	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		Broken Taboo	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
4	A German movie breaks the last tabu in the modern film-making industry by having the Nazi dictator Hitler as its main character.	A film produced in Germany infringes the ultimate taboo in modern cinema, which sees the lead character as the Nazi dictator Adolf Hitler	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		A film produced in Germany breaks the ultimate taboo in modern film-making by having the nazi dictator Adolf Hitler as a main character	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

		A film produced in Germany breaks the last taboo in modern cinema - it features the Nazi dictator Adolf Hitler as its main character		
		A film made in Germany has broken ultimate taboo with modern cinematography, with the main character being the Nazi dictator Adolf Hitler		
		A film produced in Germany has broken the ultimate taboo of modern cinema, with Nazi dictator Adolf Hitler as its main character.		
		A German film is violating the ultimate taboo in the realms of modern cinematography, casting the Nazi dictator, Adolf Hitler, as the principal character		
		A film produced in Germany has broken the final taboo in modern cinema, featuring Nazi dictator Adolf Hitler as its main character		
5	The film premiere took place in Berlin and sparked major controversy	The film had its premiere in Berlin and has started a controversy of epic proportions.		
		The premiere of the film took place in Berlin and gave rise to widespread controversy		
		The film's premiere took place in Berlin, causing great controversy.		
		The film premier took place in Berlin and caused a lot of controversy.		

6	Michael Moore accuses the Bush administration in the documentary 'Fahrenheit 9/11'.	Michael Moore lays down the party line to the Bush administration in the documentary "Fahrenheit 9/11"	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5
		Michael Moore demonstrates in front of the White House	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5
		Michael Moore breaks through the Bush administration's wall in the documentary Fahrenheit 9/11.	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5
		Micheal Moore takes on the Bush administration in his documentary "Fahrenheit 9/11.	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5
		Michael Moore explores the divide in the Bush administration in the documentary 'Fahrenheit 911'	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5
		Michael Moore puts the Bush administration up against the wall in the documentary "Fahrenheit 9/11"	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5
		Michael Moore blames the Bush administration in the documentary Fahrenheit 9/11	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5
7	Kerry promisses to fight for the US	Kerry promises to fight for the American presidency	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5
		Kerry promises to fight for the USA.	○ 1 □ 2 □ 3 □ 4 □ 5	○ 1 □ 2 □ 3 □ 4 □ 5

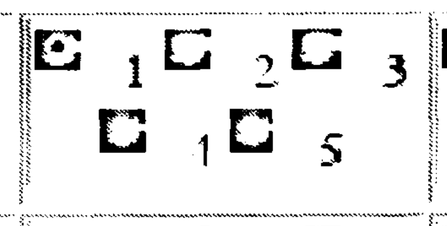
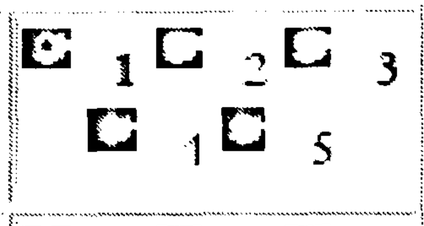
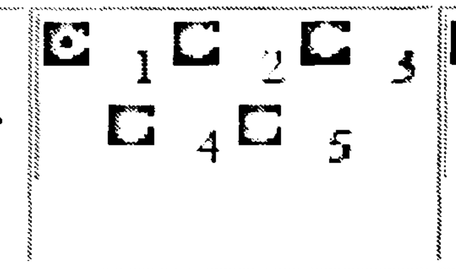
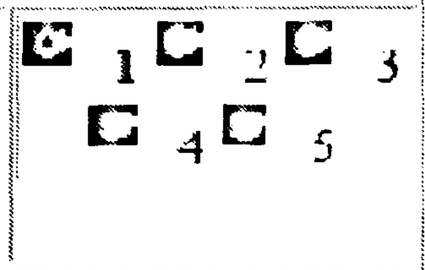
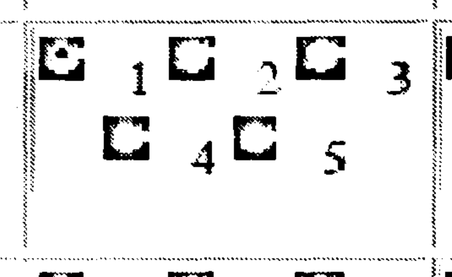
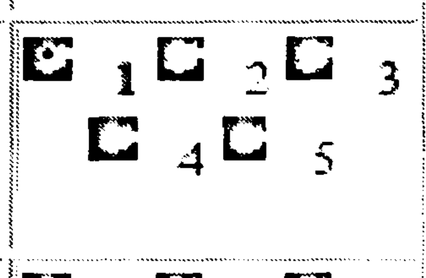
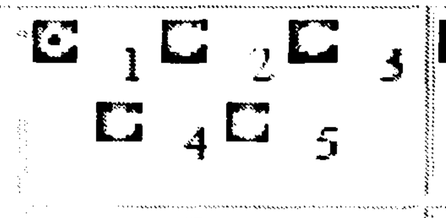
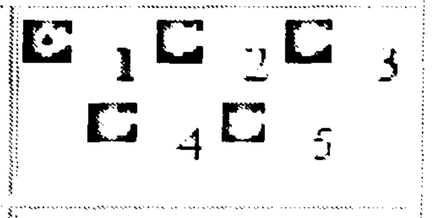
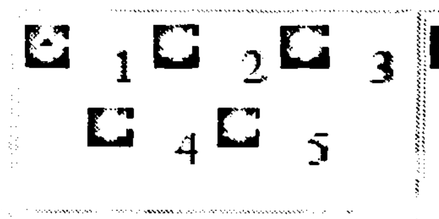
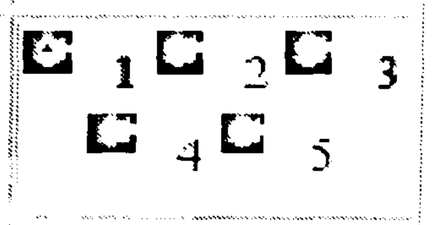
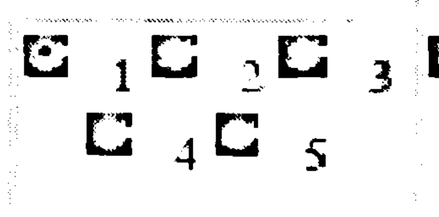
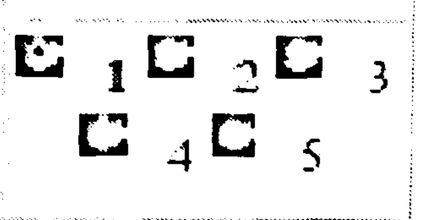
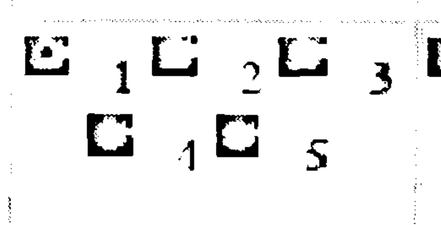
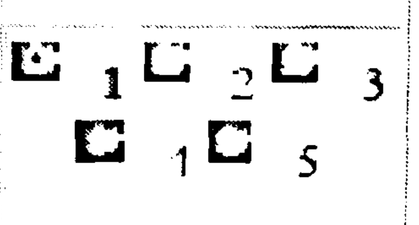
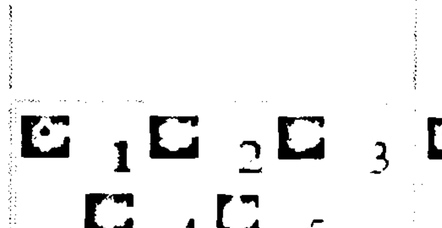
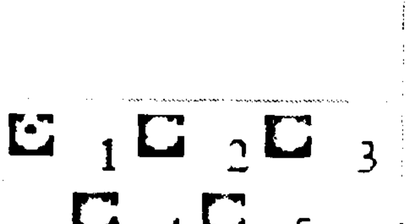
		Kerry promises to fight for the USA.	1 2 3 4 5	1 2 3 4 5
		Kerry declares/promises his fight for USA	1 2 3 4 5	1 2 3 4 5
		Kerry promises to battle for USA.	1 2 3 4 5	1 2 3 4 5
		Kerry continues his fight for the USA	1 2 3 4 5	1 2 3 4 5
		Kerry promises to fight for the USA	1 2 3 4 5	1 2 3 4 5
8	John Kerry gave the acceptance speech for being nominated to run for president on behalf of the US Democratic Party	John Kerry has announced his acceptance of his nomination by the Democrats as the rightful candidate for the job of the US president.	1 2 3 4 5	1 2 3 4 5
		John Kerry gave his speech in acceptance of the Democratic Party's Presidential Nomination.	1 2 3 4 5	1 2 3 4 5
		John Kerry has spoken out in his acceptance speech by asserting himself as the right candidate from the Democrats to become US President	1 2 3 4 5	1 2 3 4 5
		John Kerry has directly delivered a speech of acceptance of being the Democratic Party's candidate for the job of President of the USA	1 2 3 4 5	1 2 3 4 5

		John Kerry delivered the acceptance speech for the nomination as the Democrat Party's candidate to stand for the job of US President.	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		John Kerry has delivered a speech accepting his nomination as the Democratic Party's candidate to the post of President of the USA	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		John Kerry gave a speech accepting his nomination as the Democrat Party's Presidential candidate.	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
9	Tour de France: Lance Armstrong crushes his opponents once more	Tour de France: Lance Armstrong crushes new opponents	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		Tour de France: Lance Armstrong's crushing defeat of his rivals.	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		Tour de France: Lance Armstrong is crushing new adversaries	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		Tour de France: Lance Armstrong crushes adversaries once again.	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		The Tour de France: Lance Armstrong puts pressure on new competitors.	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
		Tour de France: Lance Armstrong has crushed on the recent challengers.	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

		The Tour de France: Lance Armstrong strives over adversary	1 2 3 4 5	1 2 3 4 5
10	The american cyclist L.A. is almost sure to win - for the sixth consecutive time - the Tour de Fr, following winning the 19th timed 55-km individual sprint in Besancon.	American cyclist Lance Armstrong is now almost unmistakably going to win in the finals. He has seized victory consecutively in the Tour de France. He has consecutively won the 19th stage at 55 kph in Besancon.	1 2 3 4 5	1 2 3 4 5
		The American cyclist Lance Armstrong can be sure of another victory, his sixth consecutive in the Tour de France – something journey, against his personal chronometer, 55 kilometers from Besancon.	1 2 3 4 5	1 2 3 4 5
		The American cyclist, Lance Armstrong, is now almost certain of a final victory – his sixth in succession in the Tour de France – after that of the 19th stage, at the end of 55 km to Besancon.	1 2 3 4 5	1 2 3 4 5
		American cyclist, Lance Armstrong, is currently close to overall victory, marking his sixth consecutive Tour de France win, following on from winning the 19th stage in Besancon, traveling at an average speed of 55km/h	1 2 3 4 5	1 2 3 4 5
		American cyclist Lance Armstrong is now almost certain of final victory – his sixth consecutive one in the Tour de France – after winning the 19th stage, the 55km individual time trial at Besancon.	1 2 3 4 5	1 2 3 4 5
		The American cyclist Lance Armstrong is almost guaranteed victory in the Tour de France – for the sixth consecutive time	1 2 3 4 5	1 2 3 4 5
		American cyclist Lance Armstrong is on the point of achieving final victory – his sixth consecutive win at the Tour de France – at the 55km-long 19th stage at Besancon.	1 2 3 4 5	1 2 3 4 5

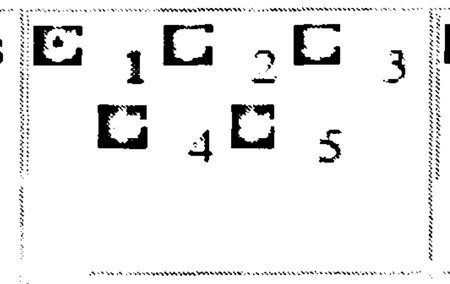
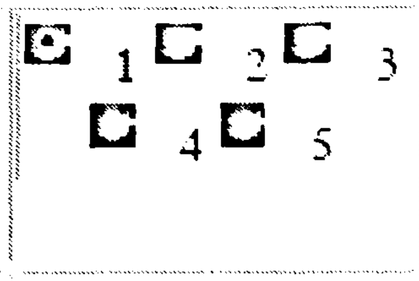
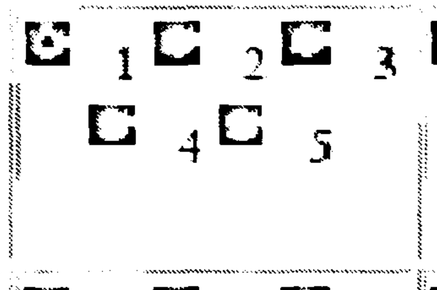
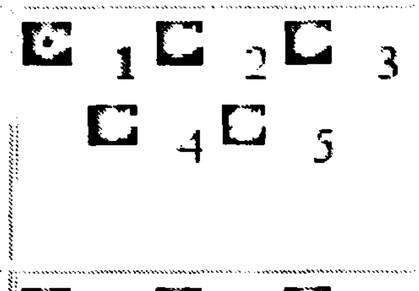
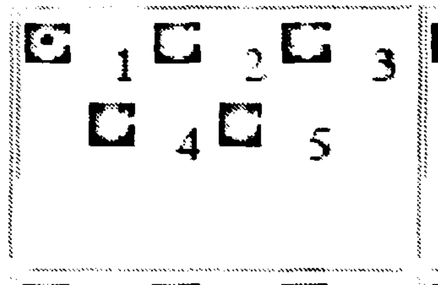
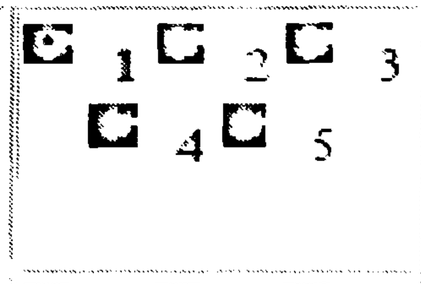
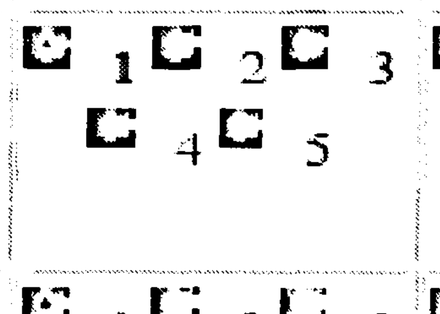
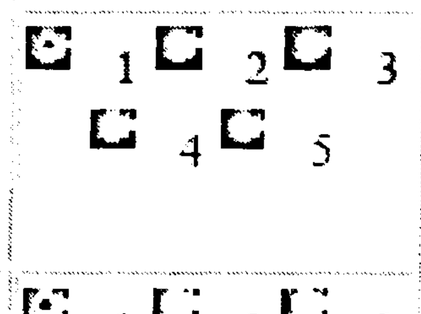
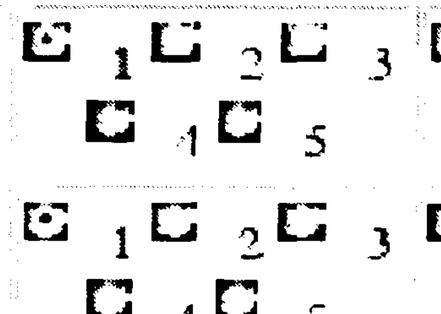
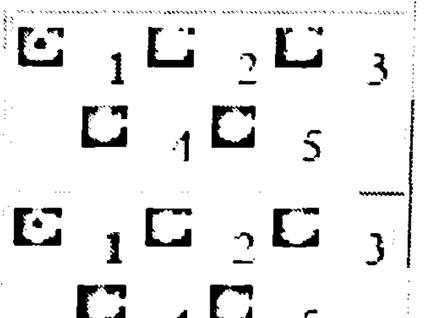
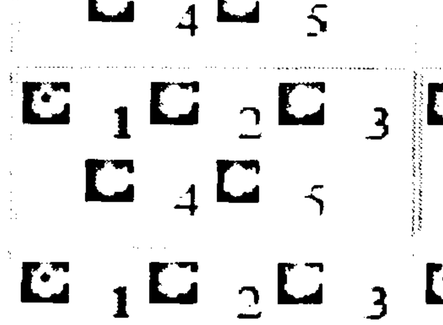
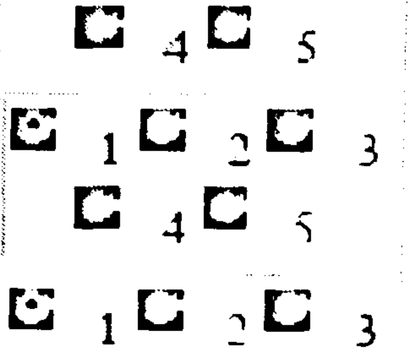
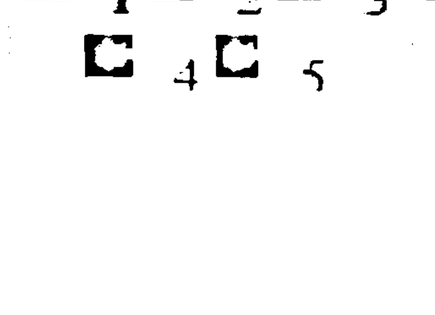
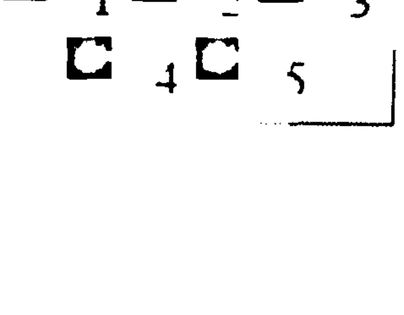
11	Hurricane Ivan is heading for Jamaica	Hurricane Ivan now heading for Jamaica	1 2 3 4 5	1 2 3 4 5
		Hurricane Ivan heads for Jamaica.	1 2 3 4 5	1 2 3 4 5
		Hurricane Ivan heads towards Jamaica	1 2 3 4 5	1 2 3 4 5
		Hurricane Ivan is headed for Jamaica	1 2 3 4 5	1 2 3 4 5
		Hurricane Ivan heads towards Jamaica	1 2 3 4 5	1 2 3 4 5
		Hurricane Ivan heads towards Jamaica	1 2 3 4 5	1 2 3 4 5
		Hurricane Ivan heads for Jamaica.	1 2 3 4 5	1 2 3 4 5
12	The island's inhabitants are getting ready to face hurricane Ivan, which is believed to be the strongest for decades.	Island dwellers are preparing themselves for Hurricane Ivan to attack, a hurricane which many believe to be the most powerful ever seen in the last few decades	1 2 3 4 5	1 2 3 4 5
		Island inhabitants are getting ready to face Hurricane Ivan, which it is believed will be the most powerful hurricane in recent decades.	1 2 3 4 5	1 2 3 4 5

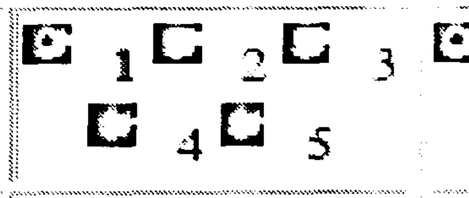
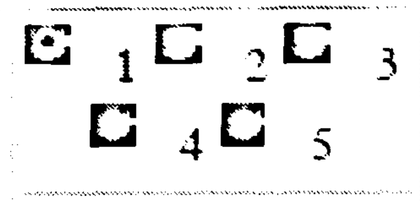
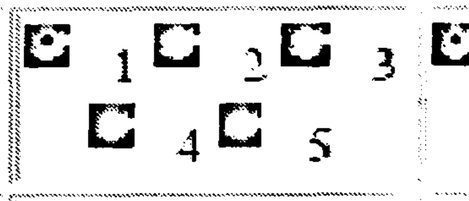
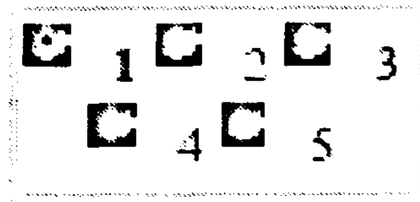
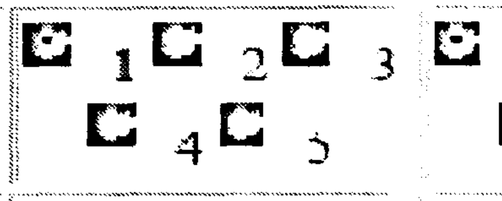
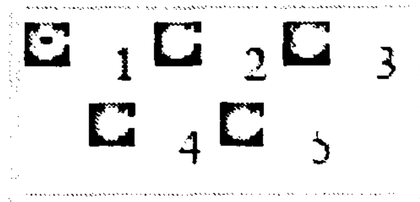
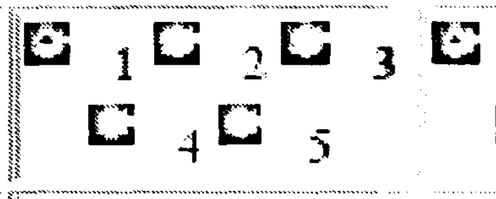
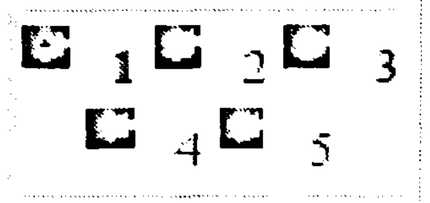
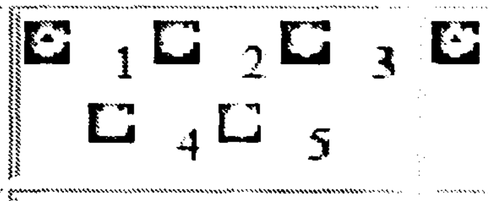
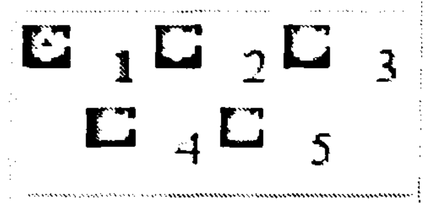
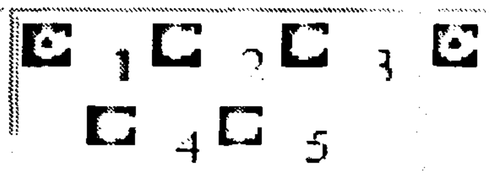
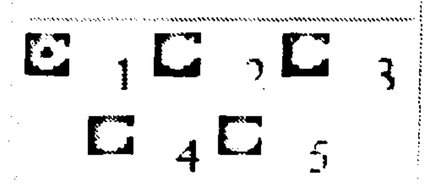
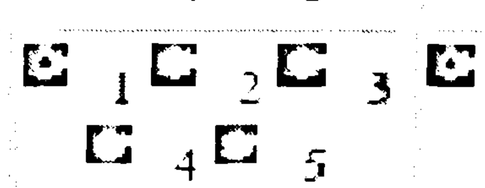
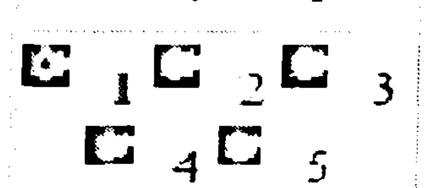
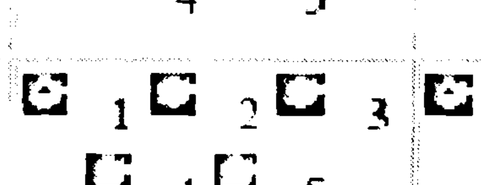
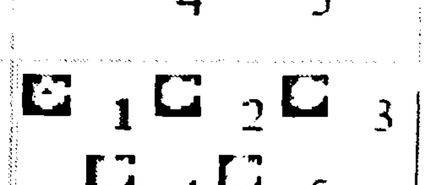
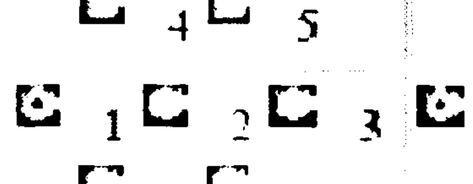
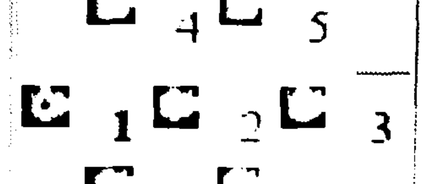
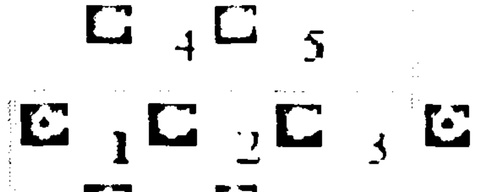
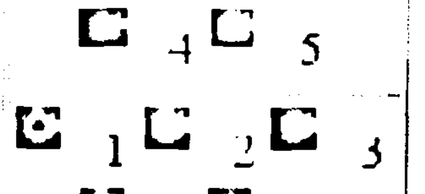
		Inhabitants of the island are preparing to face Hurricane Ivan which is believed to be the worst hurricane in the last decade.	1 2 3 4 5	1 2 3 4 5
		People on the island are preparing to face Hurricane Ivan, which is believed to be the most powerful hurricane of the last decade.	1 2 3 4 5	1 2 3 4 5
		Inhabitants of the island are preparing to face hurricane Ivan which is believed will be the most violent hurricane of the last decade.	1 2 3 4 5	1 2 3 4 5
		The island's inhabitants are bracing themselves to face hurricane Ivan that will become the worst hurricane in the last decade.	1 2 3 4 5	1 2 3 4 5
		Inhabitants of the island are preparing to face Hurricane Ivan, which it is thought will be the most powerful hurricane in the last decade.	1 2 3 4 5	1 2 3 4 5
13	The hurricane - initially rated as being class V, the strongest one - has lost some intensity, but meteorologists warn that it could pick up in strength once again.	The hurricane, initially classed as a class V hurricane – the most powerful category, has lessened many times in intensity but meteorologists warn that it could regain its strength/power.	1 2 3 4 5	1 2 3 4 5
		This hurricane would be in the V-category of hurricanes which is the strongest class – it will concentrate its intensity and may revive in force.	1 2 3 4 5	1 2 3 4 5
		The hurricane, which was initially placed in class V – the most powerful category – has decreased in intensity, but meteorologists warn that it could still get stronger.	1 2 3 4 5	1 2 3 4 5
		The hurricane, which was initially classed as a category 5, the most powerful category of hurricanes, has dropped in intensity, but meteorologists are warning that it may strengthen again.	1 2 3 4 5	1 2 3 4 5

		The hurricane, which was initially deemed to be a class V – the most powerful – has fallen in intensity, but meteorologists warn that it may get stronger again.		
		The hurricane which was at first classified as a Class V hurricane, the most powerful, has now decreased in power. However meteorologists warn that its power could return at any moment.		
		The hurricane, which was initially classed in category 5 – the worst, has reduced in force but meteorologists warn that it could regain strength.		
14	With a wind speed of over 230 km/h, the hurricane has already destroyed entire areas and caused at least 20 casualties in the South-East Caribbean.	With a wind speed of over 230 kmph the hurricane has already devastated depressed areas and brought about the deaths of almost 20 people in the south-east Caribbean.		
		With a wind speed of approximately 230km/h, the hurricane has already struck every single south-eastern Caribbean island and at least 20 people have died.		
		With a speed (and air current) of around 230kph, the hurricane has already devastated the whole area and 20 people have been killed in the south east of the Caribbean.		
		With a speed of over 230km/hour, the hurricane has already devastated the central area bringing about the deaths of some 20 people in the South-eastern Caribbean.		
		With wind speeds of over 230km/h, it has already completely devastated the area and caused the death of some 20 people in the South-East Caribbean		

		With winds of over 230 kph, the hurricane has already devastated entire areas and caused the death of some 20 people in the south-eastern Carribean.		
		With a wind speed of up to 230 km/hr, the hurricane has already devastated whole areas of the south-east Caribbean and killed 20 people.		
		Hundreds of thousands of Jamaicans have been forced to evacuate coastal areas.		
		Hundreds of thousands of Jamaicans have been forced to evacuate coastal areas.		
		Hundreds of thousands of Jamaicans have been forced to evacuate coastal regions.		
15	Hundreds of thousands of Jamaicans were forced to evacuate the coastal areas.	As a result, thousands of Jamaicans have been forced to evacuate coastal areas.		
		Hundreds of thousands of Jamaicans were forced to flee from the coastal areas.		
		A lot of Jamaicans are being forced to evacuate the area by the coast.		
		One hundred/Hundreds of thousands of Jamaicans have been forced/obliged to evacuate the coastal area.		
16	The hospitals are on alert and the schools, shops and	Hospitals are on red alert yet again, and schools, shops and airports have been closed.		

	aeroports have been closed.	Hospitals are on alert and schools, shops and airports have been closed.	1 2 3 4 5	1 2 3 4 5
		Hospitals are on alert again/but şcolile (couldn't find this) in addition to this the airport has been closed.	1 2 3 4 5	1 2 3 4 5
		Hospitals are on alert and once again schools, shops and airports have been closed.	1 2 3 4 5	1 2 3 4 5
		Hospitals are on alert and schools, magazines and airports have been closed.	1 2 3 4 5	1 2 3 4 5
		Hospitals and schools have been put on alert; shops and airports have been closed.	1 2 3 4 5	1 2 3 4 5
		Hospitals are on red alert and shops and airports are closed.	1 2 3 4 5	1 2 3 4 5
17	The BBC correspondent reports, however, that the inhabitants of the island of Jamaica are calm and that many of them have chosen to wait for the hurricane at home instead of going to special shelters.	The BBC correspondent is reporting, however, that the Jamaicans are not panicking, and that many are even deciding to wait in their homes for the hurricane to strike rather than head for shelter.	1 2 3 4 5	1 2 3 4 5
		The BBC correspondent is still reporting/transmitting however that the islanders have not started to panic and many have even remained at home in preparation of the hurricane, in a place that is safe.	1 2 3 4 5	1 2 3 4 5
		The BBC has made broadcasts to the islands' inhabitants requesting that they don't panic, and many have even chosen to stay at home in shelters to wait for the hurricane.	1 2 3 4 5	1 2 3 4 5

		The BBC correspondent reporting however that inhabitants of the island are in a state of panic even though they have decided to stay at home and expect this to be the best place to find refuge.		
		The BBC correspondent says that nevertheless, the inhabitants of Jamaica are not panicking, and many have even chosen to remain at home to await the hurricane instead of going to the shelters.		
		However, as the BBC correspondent in Jamaica reports, the island dwellers are not only in a state of calm, but they also have resolved to remain so, despite the threathening hurricane, until they can find refuge and shelter.		
		The BBC is transmitting nevertheless that the inhabitants of the island of Jamaica are not panicking yet and some are even choosing to stay at home in anticipation of the hurricane rather than seeking refuge.		
18	Jamaica has not been hit by a hurricane for 16 years.	Jamaica has not been struck by a hurricane for 16 years.		
		Jamaica has not experienced a hurricane attack for 16 years.		
		Jamaica has not been hit by a hurricane in the last 16 years.		
		Jamaica hasn't been hit by a hurricane since 16 years ago.		

		Jamaica hasn't been hit by a hurricane in 16 years.		
		Jamaica hasn't been hit by a hurricane for 16 years.		
		Jamaica has not been hit by a hurricane in 16 years.		
		After going through Jamaica, hurricane Ivan will head straight towards Cuba and south east USA.		
		After passing through/battering Jamaica, Ivan will hit Cuba and the south east of the United States.		
		After having hit Jamaica the hurricane is said to be heading for Cuba and the United States.		
19	After Jamaica, hurricane Ivan will move towards Cuba and S-E US.	In all likelihood, after hitting Jamaica, hurricane Ivan will make for the coast of Cuba and the South East of the United States.		
		Once it has passed Jamaica, Hurricane Ivan will head toward Cuba, and the South-East of the United States.		
		After crossing Jamaica, Hurricane Ivan will head towards Cuba and the south-eastern US.		
		After passing over Jamaica, hurricane Ivan will head towards Cuba and the south-east of the United States.		

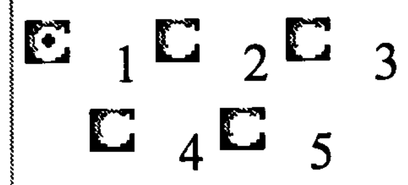
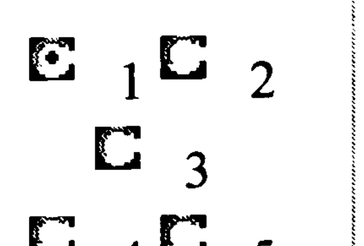
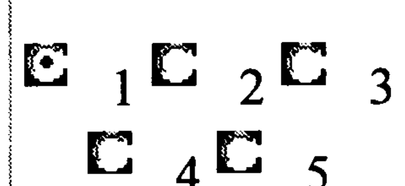
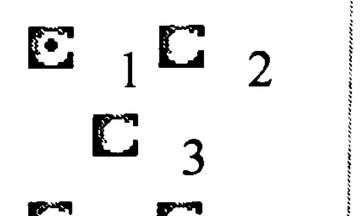
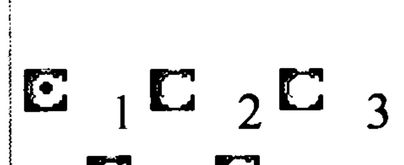
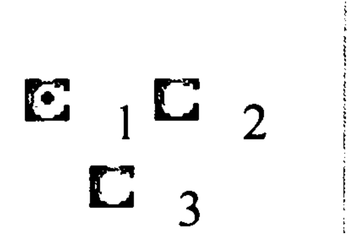
20	The residents and tourists in Florida have already started evacuating.	Both citizens and tourists in Florida have already started to leave.	1 2 3 4 5	1 2 3 4 5
		Inhabitants and tourists in Florida have already begun to evacuate.	1 2 3 4 5	1 2 3 4 5
		Inhabitants and tourists in Florida have already started to be evacuated.	1 2 3 4 5	1 2 3 4 5
		Inhabitants and tourists in Florida are already starting to evacuate.	1 2 3 4 5	1 2 3 4 5
		Inhabitants and turists in Florida have already begun to evacuate.	1 2 3 4 5	1 2 3 4 5
		Inhabitants and tourists in Florida have already begun to be evacuated.	1 2 3 4 5	1 2 3 4 5
		Inhabitants and tourists in Florida have already begun evacuating.	1 2 3 4 5	1 2 3 4 5

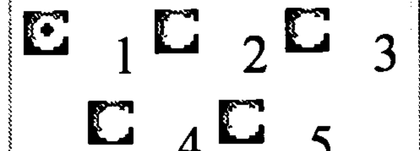
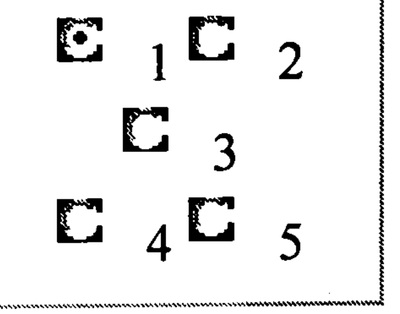
Form 4

Please rate from 1 to 5 (1=lowest and 5=highest) how well the summaries express the content of the model (content) AND how natural their wording is (style)

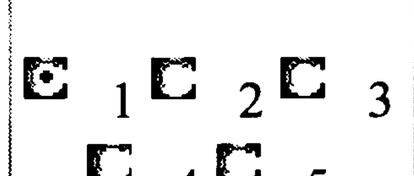
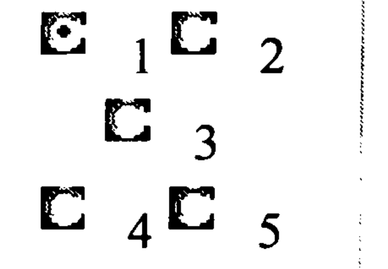
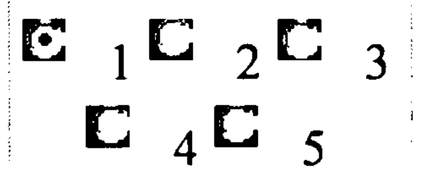
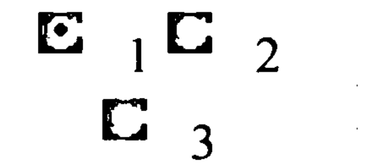
Model 1: Ivan is the worst hurricane to ever hit the Caribbean islands. At the moment it has reached level 4/5, but specialists warn it can reach the maximum level, too. 14 casualties were recorded in Jamaica. The hurricane is advancing by 9km/h and the wind speed is 250km/h. Evacuations have started in the Canaries and Cuba. President Fidel Castro says the government is doing everything possible to help. After that, the hurricane will move to Florida. A state of emergency has been declared in S-E USA and Florida Keys residents are to be evacuated.

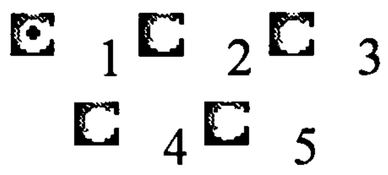
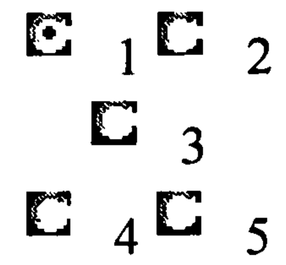
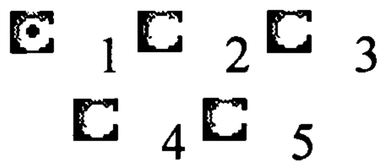
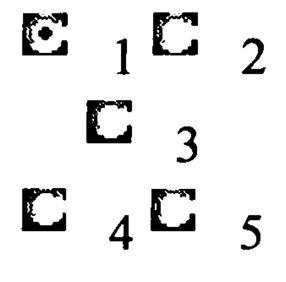
	Summary	Content	Style
1	Ivan has been recognized as the most destructive hurricane as it bore down on the Caribbean Islands. On a scale of 1-5 denoting hurricane strength, Ivan has been classified as a type 4 hurricane. Residents in Cuba and the Caribbean Islands have been warned to prepare themselves in the event of impact. The scale of its destruction cannot be estimated, but its incredible size is clear for all to see, as it travels at 9 km/h with wind speeds reaching 250 km/h. On Sunday afternoon it should reach the Canary Islands, with greater wind speeds noted the previous day. The governor there has urged the 45, 000 inhabitants to prepare for a direct hit. Tens of thousands of Cubans have been evacuated from the south coast, and the president, Fidel Castro, has assured the public that the government is doing everything it can to protect the people. After Cuba, meteorologists state that the Gulf of Mexico is next on the hurricane's path.	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

2	Hurricane Ivan is the most devastating hurricane ever to hit the Caribbean. On the danger scale of 1-5, hurricane Ivan has reached level four. Meteorologists have warned it may reach also maximum level. The inhabitants of Cuba have been warned to prepare themselves for the worst. In Jamaica, Hurricane Ivan caused the deaths of 14 people. The cost of the damage can still not be estimated, but the scale of the destruction can be seen with the naked eye. The hurricane reached speeds of 250 km/h. It is expected to hit the Caribbean island on Sunday afternoon and is set to get stronger on Saturday afternoon. The governor has warned 45,000 people to prepare for a direct impact. Tens of thousands Cubans living on the South coast of the isle have been moved to an area considered more secure. Shops have been looted by inhabitants seeking essential food items. The hurricane is set to cross the Gulf of Mexico and head towards the Southern state of Florida. Authorities have ordered an evacuation of the Florida Keys.		
3	Hurricane Ivan – devastating the Caribbean.The hurricane was between 1 and 5 on the scale. It has killed 14 people in Jamaica and was around 250kph. The governor in the Canary Islands has declared a state of emergency and told the 45,000 inhabitants to prepare for a direct hit. The inhabitants on Cuba are being evacuated in the areas to be badly hit by the hurricane. The president Fidel Castro has declared that the governor would do everything to protect the population. After hitting Cuba, meteorologists say that the hurricane will head towards the Golf of Mexico.The south east of the United States is also in state of emergency.		
4	Hurricane Ivan is the largest hurricane to have ever hit the Caribbean. On a risk scale of 1-5 it is at 4 but meteorologists warn it may reach 5. 14 people have already died in Jamaica and wind speeds are getting up to 250 km/h. Ivan is expected to hit the Canary Islands on Sunday afternoon. Authorities there have declared a state of emergency and have warned its inhabitants to expect a direct hit from the hurricane. The military is also evacuating Cubans where the people are very worried. But Havana may be spared and Ivan may head instead to the USA where there is also a state of emergency in Florida.		

5	-hurricane Ivan killed 14 in Jamaica -Cuba has evacuated its coastal areas -Ivan will hit Florida after Cuba -Florida is in a state of emergency, the Keys have been evacuated -it's the 2nd hurricane to hit Florida in a month		

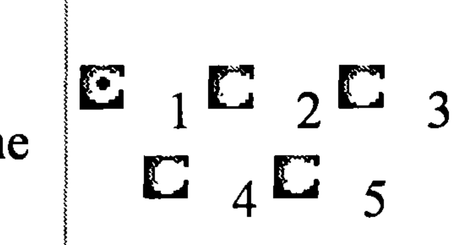
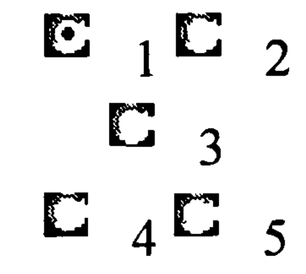
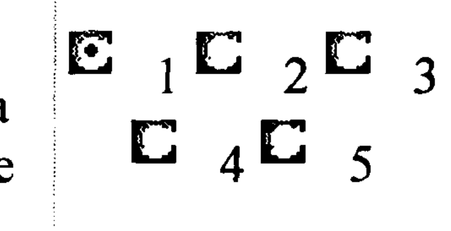
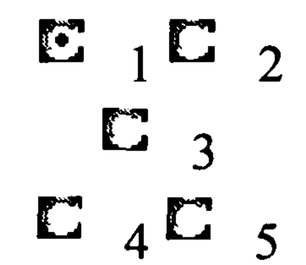
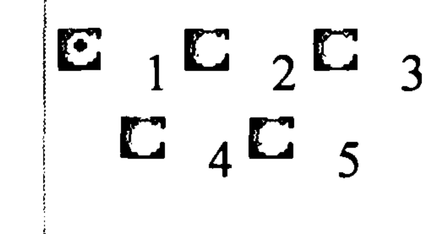
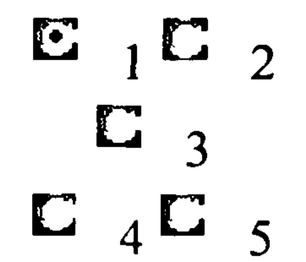
Model 2: Hurricane Frances has devastated the East coast of Florida. Many houses have been destroyed and several million houses left without power. 15% of residents - that is 2.5 million people - have been asked to evacuate. The wind speed is 170km/h and meteorologists warn about possible flooding. The hurricane is moving more slowly, but still very dangerously. Frances is like a giant storm with a 650km radius. In August, hurricane Charley caused damages of $11 billion in Florida and claimed 26 lives.

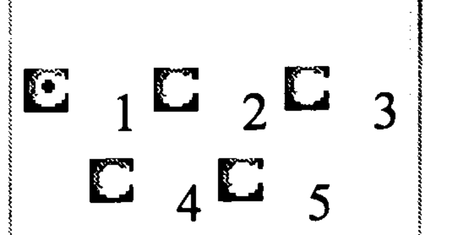
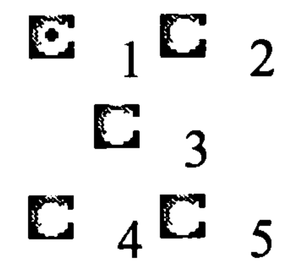
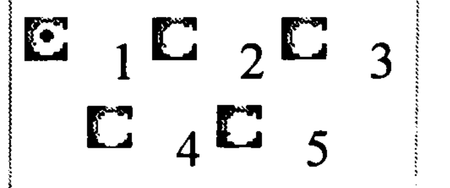
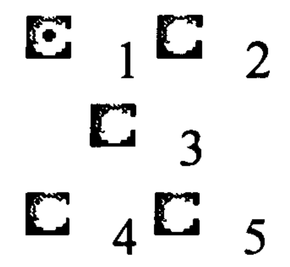
	Summary	Content	Style
1	Hurricane Frances has devastated the East Coast of Florida. Many buildings have been destroyed and millions houses have lost their electricity supply. Authorities have confirmed almost two and a half million people live in the danger zone. This is the largest evacuation in the history of Florida State with almost 15% of the population being moved. Florida has been hit again, following hurricane Charley which caused the deaths of 26 people and millions of dollars worth of damage. Inhabitants of the affected area are still without electricity and drinking water. Meteorologists warn there could yet be floods as water levels have well exceeded normal rates. Wind speeds reached 170 km/h and meteorologists warn that there is a chance of flooding as the water level is already well above average and heavy rain is forecast. Although Frances is not moving as fast as Charley it is still a threat. Frances is an enormous storm with a perimeter of 650 km. Inhabitants are worried. Florida has still not recovered from Hurricane Charley in August.		
2	Hurricane Frances has laid the south-east coast of Florida to waste. Many are living in damaged houses, liable to fall, and millions of houses are without electricity. With two and a half million people fleeing the area, this is the biggest evacuation Florida has ever seen. Previously Hurricane Charley hit Florida killing 26 people and created		

	damage worth millions of dollars. Electricity and drinking water are on short supply. With wind speeds of 170 km/h, meteorologists warn of the possibility of a flood. The BBC correspondent claims that Frances is a more powerful hurricane than Charley. American meteorologists predict that the Stuart district, 175 km from Miami, will be hit on Sunday. The effects of Frances will be felt over a large area as it has a perimeter of 650 km. For the past few weeks the inhabitants of Florida have been trying to piece their lives back together after Charley hit in August with damages amounting to 11 billion dollars.		
3	Florida is hit by hurricane Frances Many buildings have been destroyed and trees have been uprooted and over 2.5million people have abandoned their homes. Florida was hit recently by hurricane Charley which caused billions of dollars of damage and killed 26 people. Inhabitants who remain have been left with no electricity or drinking water. Winds reached speeds of 170km/h. A BBC reporter says Frances is not as strong as Charley. Frances will hit near Miami on Sunday and is 650km in perimeter. Florida estimates the damage to cost will be 11 billion dollars.		
4	Florida hit by massive hurricane Frances Hurricane Frances has devastated the coast of the state of Florida. There are (a) million(s) of families who have homes without electricity. The authorities have demanded/asked that around two and a half million people leave the area. It is the biggest evacuation in the history of the state of Florida. The state was hit not long ago by hurricane Charly and billions of dollars of loss/damage. Meteorologists warn that there is still a risk. Thee BBC correspondent broadcasting/reporting from the beach at New Smyrna said that the hurricane Frances wasn't as powerful as Charly. Meteorologists say that the hurricane first hit the area of Stuart, 175km from Miami.		

Model 3: Hurricane Ivan has hit the east coast of Jamaica. The prime minister, PJ Patterson, has declared state of emergency and the army is patrolling. Waves are up to 10m tall. Most homes are not fit to withstand the hurricane's power and half a million inhabitants were asked to evacuate on Friday. Ivan is the worst hurricane to hit Jamaica in 50 years. It has changed its course to the west of the island. Before hitting Jamaica, it had destroyed 90% of Granada - according to

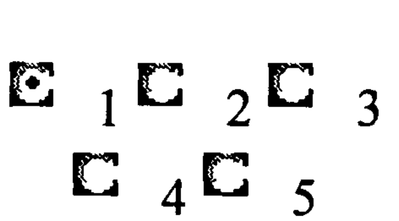
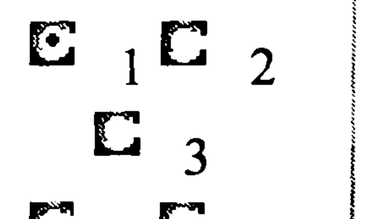
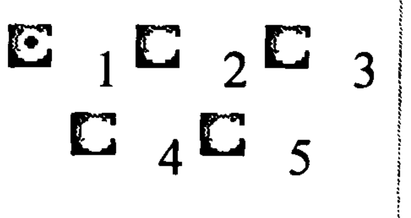
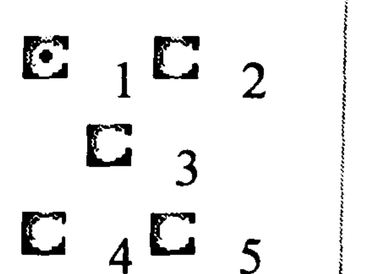
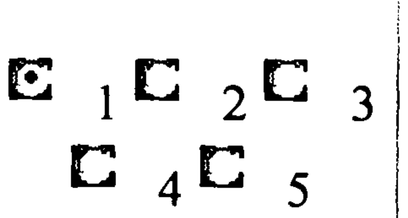
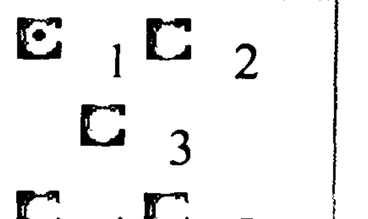
the country's Prime Minister - and killed 27 of its residents. 2/3 of the 95,000 residents are now homeless. Foreign aid is starting to arrive.

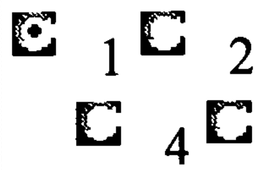
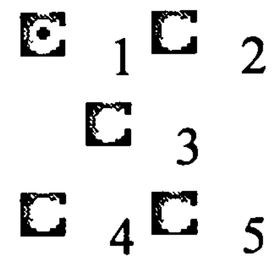
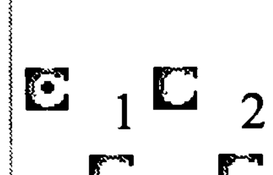
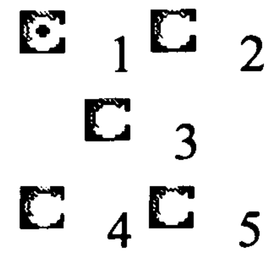
	Summary	Content	Style
1	Hurricane Ivan hits Jamaica The hurricane has produced abundant flooding and extreme power. The Prime Minister declared a state of emergency and the electricity supply/power was interrupted/broken again. Ivan has produced massive lost in the Caribbean, 27 people have already been lost with the majority in Grenada. Meteorologists say that the winds reached level 4. Ivan is the most devastating hurricane to hit Jamaica in 50years. Cuba and the south eastern United States are also in state of alert. The Red Cross with volunteers is already on the scene and says that two thirds of the population 95,000 has been left homeless.The Prime Minister of Grenada told the BBC that 90% of the island had been destroyed.		
2	Ivan hits Jamaica A state of emergency has been declared in Jamaica by the Premier after Ivan hit the east coast causing power shortages. Ivan has already killed 27 people in the Caribbean with wind speeds of up to 250km/h. Ivan is the worst hurricane to hit Jamaica in 50 years. Cuba has also called a state of emergency and so has south-east of the USA. Volunteers from the Red Cross are helping the 95,000 people who are without homes due to the hurricane. Granada's Premier has declared that 90% of his country has been devastated.		
3	Hurricane Ivan with its powerfully strong winds and torrential rain is now moving towards Jamaica. The Prime Minister, P J Patterson, has declared a state of emergency, and electricity is no longer being supplied. The hurricane has already made itself known in the Caribbean with 27 people losing their lives, the majority coming from Grenada. The hurricane's wind speed is estimated at 250 km/h, and on a scale of 1-5 of hurricane strength, Ivan has been classified as a type 4 hurricane. Jamaica has not witnessed any hurricane with such ferocity in the past fifty years; Ivan is		

	currently traveling at 18 km/h. Red Cross volunteers state that two-thirds of the 95, 000-strong population in Grenada are now homeless. The Prime Minister in Grenada, Keith Mitchell, has stated to the BBC that 90% of the island has been destroyed, and he is now calling for national support.		
4	-Ivan caused big waves on the east coast of Jamaica -Jamaica is in a state of emergency -power supplies were interrupted -the majority of those killed by Ivan were in Grenada -it was the worst hurricane in Jamaica for 50 years -90% of Grenada was destroyed		
5	To the East of Jamaica a tidal wave reached the height of ten metres at the East of Jamaica. Hurricane Ivan has caused heavy rain and extremely strong winds. The Prime Minister declared a state of emergency and electricity supplies were interrupted. Military patrol the streets. Hurricane Ivan has caused the deaths of 27 people the majority of whom in Grenada. Winds gusted at a speed of 250 km/h meteorologists recorded it as a force 4 hurricane. Most houses have been ruined as they were built out of wood. The authorities have announced that half a million inhabitants (a fifth of the entire population) are in the danger zone. Some inhabitants refused to leave their homes for fear their homes would be robbed and looted. Ivan could be the worst hurricane to hit Jamaica in more than 50 years. Cuba and the South East States of America are also on a state of alert. 60,000 people have been evacuated from the Florida Keys area for the second time in two months. The worst effected area was Grenada. Volunteers from the Red Cross declared that two thirds of the island's population have lost their homes. The Prime Minister of Grenada told the BBC that 90% of the island had been destroyed. He declared a national state of emergency.		

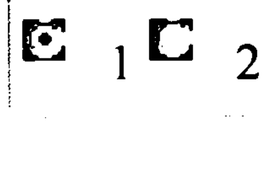
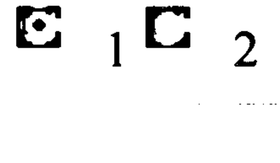
Model 4: After hitting the Cayman islands on Sunday, Ivan is moving towards Cuba, though on a changed route.1 mil Cubans have been evacuated and Fidel Castro has made several appearances on national TV informing the people about Ivan's evolution. Havana does not appear to be on its path. However, shops have been very busy as many people are

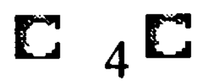
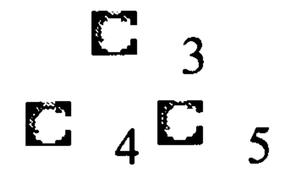
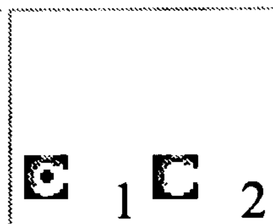
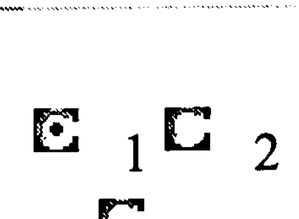
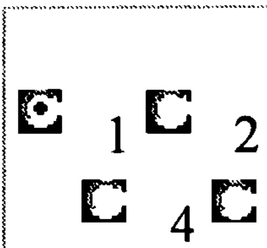
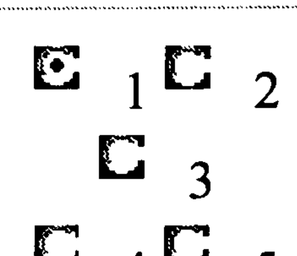
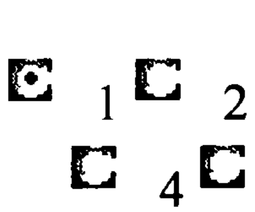
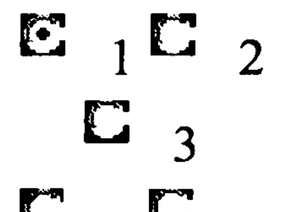
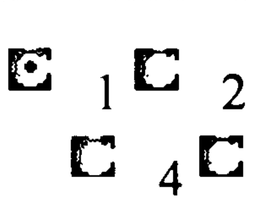
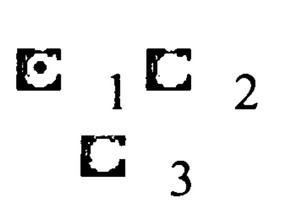
buying canned supplies. After Cuba, Ivan will move through the Gulf of Mexico to S-E US, where a state of emergency has been declared.

	Summary	Content	Style
1	Ivan caused big floods in the Cayman Islands and is now heading towards Cuba, where almost 1 million people have been evacuated to safer areas once again and Fidel Castro appeared on television warning about the dangers of the hurricane. Shops have been looted as people try to snap up the last supplies of food. Castro declared that government funds will be made available to help those affected (?). People are very worried about the damage that will be left as a result of Ivan. Meteorologists say that Ivan will next head to the Mexican Gulf and the South Eastern State of Florida where a state of emergency has already been called.This is the second hurricane in a month. An evacuation in the area of Florida Keys has been ordered.		
2	Hurricane Ivan devastates the Caribbean Hurricane Ivan has hit the Cayman Islands wreaking massive devastation. The hurricane is now heading towards Cuba. Almost 1 million people in the exposed areas have been evacuated. Thanks to the quick and efficient military operation, 10,000 people on the south coast of Cuba have been evacuated to considerably safer areas. The BBC correspondent in Havana says that the authorities have ordered those people in vulnerable houses/buildings to move their families. Fidel Castro declared that the governor will do everything to protect the population. After hitting Cuba, meteorologists say that the hurricane will head towards the Gulf of Mexico and going to hit Florida. The south east of the United States is also in a state of emergency and the authorities in Florida have ordered the evacuation of the population in the Florida Keys.		
3	-Ivan hit the Caymans on Sunday -it caused massive waves -it changed course before Cuba and didn't hit Cuba where they thought it would		

4	On Sunday, Hurricane Ivan moved towards the Cayman Islands, creating huge floods. It is now heading towards Cuba, its effects spreading further west than previously anticipated. Nearly one million people have fled from the exposed areas, and the Cuban president, Fidel Castro, has appeared on national television once more speaking about the effects of the hurricane. Tens of thousands of people along the southern coast of Cuba have been moved to safer areas. After having hit Cuba, meteorologists state that the Gulf of Mexico will be the hurricane's next target, therefore reaching the southern end of Florida. Consequently the south-eastern states in the US are in a state of emergency. This area has experienced two hurricane attacks in the last month, and the authorities are ordering everyone in Florida Keys to leave.		
5	Ivan devastates the Caribbean Hurricane Ivan hit the Cayman Islands on Sunday causing major floods. It is now on its way towards Cuba. Over 1 million people have been evacuated from the area expected to be hit. Fidel Castro even went on national television to inform the people about the hurricane. A military operation has evacuated tens of thousands of inhabitants from the south coast of Cuba. Shops have ordered in extra supplies and Fidel Castro has said his government will do everything it can to help the people affected by Ivan. Meteorologists estimate that it will head towards the Gulf of Mexico and on to the south of Florida where a state of emergency has been called.		

Model 5: More than 2 mil Americans have been ordered to evacuate before hurricane Frances reaches the east coast of Florida. After thrashing the Bahamas, the hurricane will hit on Sat. Last month, hurricane Charley produced 19 casualties and left 2,000 people homeless. Most shops have run out of water, bread and other essential produce. Governor Jeb Bush has declared state of emergency and claims to be ready for the impact.

	Summary	Content	Style
1	-2 million people were ordered to evacuate Florida before Frances hit -Frances already hit the Bahamas and will hit Florida on Saturday		

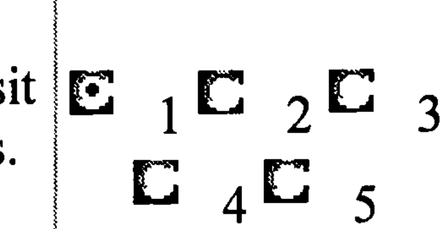
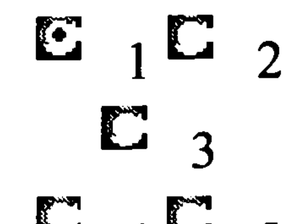
	-shops have run out of food -Florida is in a state of emergency		
2	Mass evacuation in preparation for hurricane Over 2 million Americans have been ordered to leave their homes on the East coast of Florida due to the expected hurricane. The Bahamas have already been hit and Frances is going to arrive in Florida on Saturday. Florida has also recently been hit by a hurricane. 19 people lost their lives and 2000 were without homes after Charley hit. Roads have been blocked with cars. The majority of shops have no water, bread or essential fresh produce. A state of emergency has been called by Jeb Bush, governor of Florida.		
3	Mass evacuation Hurricane Frances has already hit the Bahamas and is going to travel to Florida. Observers say that it is going to be the most violent storm in the history of Florida. The governor Jeb Bush has declared a state of emergency. The majority of shops have remaining water, bread and other essential supplies.		
4	Mass evacuations are taking place as fears of the coming hurricane grow. Nearly 2 million people have agreed to leave parts of Florida as Hurricane Frances is set to hit the East coast of the state. The hurricane has already hit the Bahamas and will arrive in Florida on Saturday. Observers say it could be the worst storm in the state's history. 19 people were killed and 2000 remain homeless after Charley hit last month. The authorities have reiterated people should not ignore the warnings. Motorways have been blocked with cars as people flock to leave the area. Most of the shops have run out of water, bread and essential products. Governor Jeb Bush declared a state of emergency and said they were ready to take necessary measures. Inhabitants are surprised but want to stay in their homes (?)		
5	Approximately 2 million Americans have been ordered to leave the area before Hurricane Frances reaches the east coast of Florida. The Bahamas Islands have already been hit, and Frances should reach Florida on Saturday. It has been suggested that this hurricane's effect will be the largest Florida has had to deal with for some time. Nineteen people lost their		

	lives in Florida and 2000 people were made homeless when the last hurricane, Charley, struck. The authorities have urged everyone to leave, without exception. The majority of shops have now exhausted their supply of bread, water and other essentials. The governor of Florida, Jeb Bush, insists that they are prepared, taking action if necessary, and they shall not be returning.		☐ 4 ☐ 5

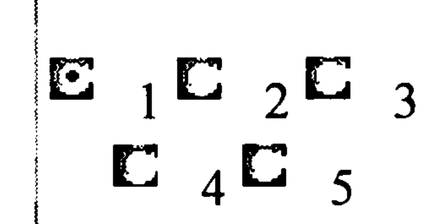
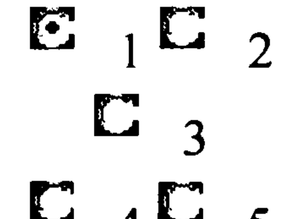
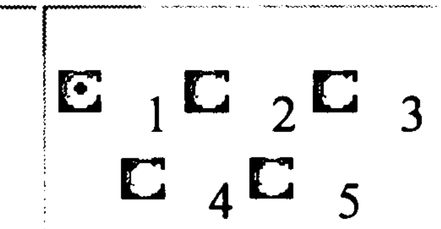
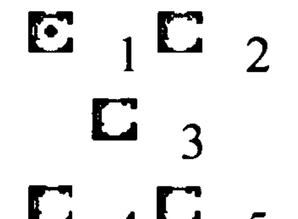
Model 6: Ivan is reported to have caused 108 casualties in total, of which 38 in the USA, 37 in Granada, 21 in Jamaica, 5 in Venezuela, 4 in the Dominican Republic, 3 in Haiti and 1 in Tobago. The tail of the hurricane died out Sun, 19 September, after 12 days of destruction in the Caribbean and the USA. While Ivan seems to have gone, hurricane Jeanne was active on Sunday to the north of the Bahamas. After Charley, Frances and Ivan, Jeanne is the fourth hurricane to hit the Caribbean this summer. In Florida, president GWB will come for the 3rd time since 15 August to assess the situation. Overall, Ivan has caused an estimated $4-10 billion worth of damage in Florida and many casualties in the Caribbean.

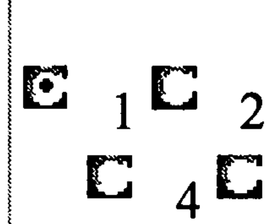
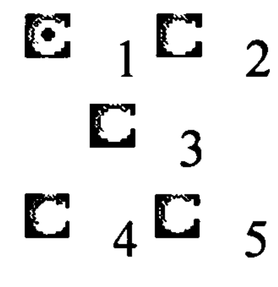
	Summary	Content	Style
1	Jeanne follows on from Ivan Ivan has caused the death of more than 100 people. Ivan brought 12 days of destruction in the Caribbean and USA this September with the tropical storm Jeanne causing 9 deaths. Jeanne, the fourth tropical storm of the summer, is now near Florida and is expected to strengthen. Many millions of people were evacuated from their homes in several countries in the Caribbean. There have been warnings of floods following Ivan. George W Bush will return to Florida for the third time since August to survey the destruction brought by this hurricane, which is thought to have cost between 4 and 10 billion dollars as thousands of homes have been destroyed and many security officials have been drafted in to help.	◉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	◉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
2	-Ivan killed 38 in USA, 108 in total -Ivan died out on the US east coast on Sunday 19th September -Ivan lasted 12 days -Jeanne killed 9 in the Bahamas -it's the 4th big storm of the summer in the Caribbean	◉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	◉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

	-it killed 7 in the Dominican Republic and 2 in Puerto Rico -George Bush will visit areas hit by Ivan -Florida was worst-hit by Ivan - 19 dead -Ivan also affected Alabama, Virginia and Washington -Ivan caused damages of between 4 and 10 million dollars -thousands of houses destroyed -army looking for victims and preventing looting -Ivan killed 70 in the Caribbean -Grenada was worst hit – 37 dead -killed 21 in Jamaica, 5 in Venezuela, 4 in Dominican Republic, 3 in Haiti and 1 in Tobago		
3	It has been estimated that Hurricane Ivan has killed at least 108 people, 38 of them from America. After twelve days of relentless attacks on the Caribbean Islands and America, a tropical storm by the name of Jeanne has already killed 9 people: 7 in the Dominican Republic and two in Puerto Rico. Thousands of people have been evacuated from their homes in the north and north-east areas of the Dominican Republic and Haiti. The National Hurricane Centre has issued a last warning concerning the potential effects the wake of Hurricane Ivan could have on the area. After the effects of hurricanes Charley and Frances, George W Bush will find himself in the states of Alabama and Florida once more to see for himself the extent of the devastation. The extent of the damage caused by Ivan in the US is estimated to be between 4-10 million dollars. Thousands of homes have been destroyed and thousands of security forces have been sent to help victims. Grenada is the worst hit with at least 37 deaths, and 90% of its buildings are either damaged or destroyed. The hurricane has also killed five people from Venezuela, four from the Dominican Republic, three from Haiti and one from Tobago.	1 2 3 4 5	1 2 3 4 5
4	The hurricane Ivan caused at least 108 deaths, 38 of those in the United States and raged for 12 days in the Caribbean and United States. Jeanne is following in Ivan's wake and has killed 7 people in the Dominican Republic and 2 in Porto Rico. Ivan reached as far north as Long Island and killed 2 women in Maryland. George Bush visited Florida to view the destruction from the hurricane, his 3rd visit since 15th August. The total cost of the	1 2 3 4 5	1 2 3 4 5

	devastation in the United States is estimated between 4 and 10 billions of dollars.		
5	According to reports Ivan caused the deaths of 108 people including 38 in USA. The tail end of the hurricane has just about gone after 12 days over the Caribbean and the USA. Hurricane Jean has just left the Bahamas and could increase in strength. Jean is the fourth big storm in the Caribbean this summer after Charley, Frances and Ivan. GWB is set to visit Florida and Alabama on Sunday having already been in the area after Charley and Frances. Electricity still has not been reconnected. Washington also caught the very edge of the storm. Damage is estimated between 4-10 thousand dollars. Security forces have been deployed to find victims and prevent looting. The hurricane had already killed 70 people in the Caribbean where Grenada was especially badly hit.		

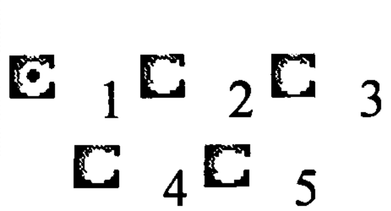
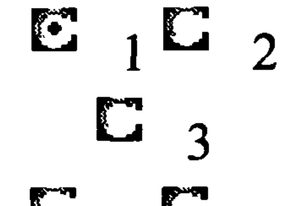
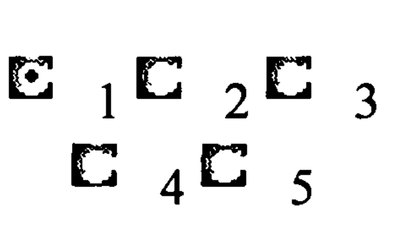
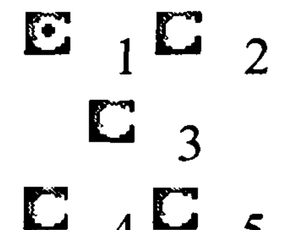
Model 7: Floods have made hundreds of casualties in the Caribbean, 500 of whom in the Dominican Republic and Haiti. The authorities in the Dominican Republic announced that 13,000 people were left homeless. 100 people died, 200 are missing and thousands are homeless in Jimani, where two rivers over flooded after two weeks of heavy rainfall. Meteorologists forecast even more rain. For fear of outbreaks, the authorities have started digging common graves. American and Canadian troops in Haiti used helicopters to send help to the worst-affected areas. Overall, there are several million dollars worth of damage.

	Summary	Content	Style
1	-floods kill 500 in Dominican Republic and Haiti -13000 left without shelter in Dominican Republic -floods came after 2 weeks of heavy rain -mass graves are being dug to avoid disease -US and Canadian soldiers based in Haiti are helping in the worst-affected areas		
2	Floods in the Caribbean take hundreds victims Almost 500 people have been injured or are missing after the floods in the Dominican Republic and Haiti. The worst affected zones are between the border separating the Hispanic countries in the Caribbean Sea. Authorities in the Dominican Republic have		

	estimated that there are around 13,000 people without shelter. After 2 weeks of heavy rain the ground is now completely flooded. Almost 200 people have disappeared in the region of Jimani. The authorities don't know the number of dead and there isn't an outbreak of an epidemic. Improvised morgues have been set up to identify the corpses. American and Canadian troops stationed in Haiti have helicopters to send aid to the worst affected. The majority of the victims are in the south east of the country.		
3	Approximately 500 people have drowned and many more are reported missing following the flash floods in the Dominican Republic and Haiti. The Dominican Republican authorities state that 13, 000 people are now homeless. In the city of Jimani more than 110 people have drowned. The floods have brought 2 weeks of torrential rain, completely ruining the soil, and according to meteorologists, more rain is to come. The local authorities have no idea how many lives have been lost. Many of the areas affected by the floods are completely isolated and military troops from the US and Canada, who are stationed in Haiti, have loaned helicopters to try and help those in the most affected areas. The majority of the flood victims come from the south-east, and the damage done is estimated to cost millions of dollars.		

Model 8: At least 22 casualties were reported after Ivan swept over the south of the USA on Thursday, 16 September. Although the hurricane hit severely the Mobile bay near the Gulf Shores, the worst damage was done a little bit further east in Florida. Houses were left without roofs, while traffic lights, trees and electric cables were also carried off. Nine alligators took advantage of the circumstances and escaped from the Gulf Shores zoo. Security forces have been instructed to shoot them. Just like in the case of Florida, president Bush declared state of emergency in Alabama, Louisiana and Mississippi, and changed his electoral campaign plans in order to go to Alabama and Florida this week-end. Ivan was the third hurricane after Charley and Frances, which caused altogether between $12 and 20 billion worth of damage. However, hurricane Jeanne threatens to hit Florida soon, as it lays a path of destruction in the Caribbean.

	Summary	Content	Style

1	On Thursday 16 September Hurricane Ivan killed 22 people in the southern US states, with wind speeds measuring 215 km/h. In the bay of Mobile near the Gulf Shores, the storms have torn down both concrete and metal buildings alike, yet more damage has been done in Florida. In the whole area, roof tiles off hundreds of houses have been ripped off, electric cables torn down and trees have been uprooted. Subsequently interstates have been closed because of the flooding and fallen trees. Furthermore, according to CNN, nine alligators from a zoo in the Gulf Shores have escaped, and security forces have been ordered to shoot them if spotted. George W Bush has put his electoral campaign on hold to see the extent of the damage. Two previous hurricanes, Charley and Frances, caused forty deaths and between 12-20 billion dollars worth of damage. However, more is to come as Jeanne, the sixth hurricane of the season, has already made its presence felt in Puerto Rico, and is now currently in Haiti		
2	Hurricane Ivan, a force 4 hurricane, hit the Gulf Coast of Alabama with gusts of more than 215 km/h. On 16 September the hurricane caused the deaths of 22 people in the South United States adding to 70 victims in the Caribbean. At its peak it was in Alabama but actually caused most damage in East Florida. Roofs, electric cables, traffic lights, trees were ripped up in the hurricane's passage. Roads, including the state's main motorway, were shut because of floods and fallen trees. A curfew was imposed last Thursday in the most affected coastal areas to avoid looting and to aide the job of the emergency services. Security forces have been ordered to shoot nine alligators which escaped from the Gulf Shores Zoo. President Bush has declared a state of emergency in the area and neighbouring states and has rescheduled his campaign tour to allow a visit to the area. This is Florida's third hurricane in less than a month which has already seen damage costs rise to between 12-20 million dollars.		

Model 9: This year, the hurricanes that hit the Caribbean have been the strongest ever and have formed in the shortest time. Ivan is on its way over Alabama, Louisiana, Mississippi and Florida, causing extensive destruction. Ivan has been one of the worst hurricanes ever in the Caribbean, but what is more worrying is that a new one, Jeanne, is currently threatening Puerto Rico. Ever since 1979, hurricanes have received male and female names alternatively from six

alphabetical lists. Ever since the start of the hurricane season - which usually lasts between July and the beginning of November -, 10 hurricanes occurred.

The hurricanes of the north Atlantic start off in Eastern Africa, cross the continent to the west, then arrive over the Atlantic where, conditions permitting - i.e. the surface temperature of the ocean water must be over 27-28 degrees C, and the evaporation must be sufficiently strong-, they turn into hurricanes. Hurricanes are born in different parts of the globe - such as the north Atlantic, north-east and north-west Pacific, Australia/south Pacific, as well as the north, south-west and south-east of the Indian ocean, closely supervised by meteorologists

	Summary	Content	Style
1	Ivan is now threatening the American states of Louisiana, Mississippi and Florida, a day after reaching the south coast: in its wake are fallen trees, floods, land slides and thirty are now dead. According to the meteorologists, Ivan is one of the most intense hurricanes ever seen in the Caribbean, but worse is to come as another hurricane, Jeanne, is currently threatening Puerto Rico. In the hurricane season, from July to the beginning of November, ten hurricanes have been recorded: this is not unusual, as 14 have been forecast, and Jeanne will be the eleventh so far. Ever since 1979 hurricanes have been given names in alphabetical order, in alternating male and female names. The hurricanes in the North Atlantic start life in East Africa, crossing west across the plains of Africa. In places such as the Indian and Pacific oceans the hurricanes are created out of large cumulonimbus clouds and ocean temperatures of at least 26oC, creating intense evaporation. Such hurricanes of thick and high cloud reach speeds from 118 km/h to even 300 km/h. The north Atlantic, the north-west and north-east Pacific, the Australian South Pacific, the north, south-west and south-east Indian oceans all create hurricanes, yet the numbers are more variable according to the areas where these phenomena originate, causing much meteorological surveillance.	1 2 3 4 5	1 2 3 4 5

Model 10: Americans are getting ready to face Ivan. More than one million people were asked on Tuesday to leave their homes between New Orleans and the north-west of Florida while Ivan was crossing the Gulf of Mexico and was threatening to hit the American coast on Wednesday evening. Ivan made more than 68 casualties in the Caribbean in a week, namely in Granada, Jamaica and the Caiman islands. Although thousands of residents of the southern UA states were relocating, the American census bureau believes that more than 6 million people could be affected by the storm. New Orleans is a particularly dangerous area, as most of the town is below sea level and close to the Mississippi, and the authorities advised residents to evacuate.

There were no victims reported in Cuba after Ivan swept over it on Monday evening. The hurricane has decreased in intensity to level 4 out of 5, but is still dangerous. Oil off-shore platforms and refineries were evacuated and closed in the Gulf of Mexico, which pushed the oil price beyond 50 cents/barrel Overall, Ivan made around 70 casualties in the Caribbean.

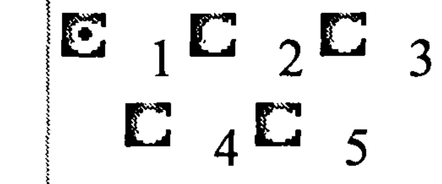
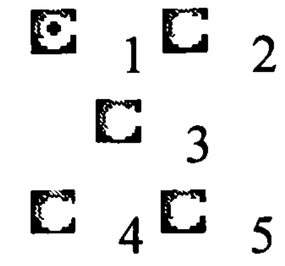
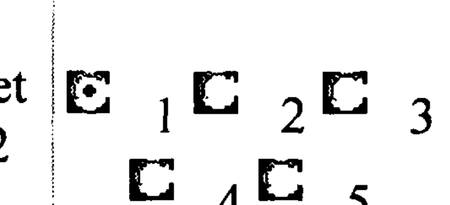
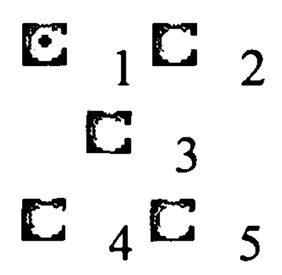
	Summary	Content	Style
1	More than a million people were ordered to leave their homes in advance of Hurricane Ivan which was due to hit American coasts. Ivan was the strongest hurricane in the Atlantic on record having caused 68 deaths in a week in the Caribbean. Thousands of inhabitants of the coastal regions in the SE States took to the roads to seek shelter. Estimations indicated more than 6 million people could be affected by the hurricane. The people of New Orleans were particularly worried. It would soon be too late to flea so those who could still get away were advised to do so. Cuba was hit but had not reported any casualties. The hurricane has weakened slightly in its progress north but is still classed as a force 4 hurricane. The authorities in Florida were preparing for their third big storm in a month after Charley and Frances. People had been ordered to leave their homes in caravans or coastal area liable to flooding. Oil companies had evacuated off-shore platforms and closed refineries in the Gulf of Mexico. International oil prices had increased. Sea levels were expected to be more than five metres higher than usual. Inhabitants of Alabama were boarding up their houses, in New Orleans people were packing up to leave. One owner of three old houses refused to leave saying she had to look after her houses. Ivan killed 70	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☉ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

	people across the Caribbean.		
2	The American authorities have urged more than one million inhabitants from New Orleans to north-east Florida to leave their homes while Hurricane Ivan crossed the Gulf of Mexico. Ivan is the cause of 68 deaths in a week in the Caribbean Islands, especially in Grenada, Jamaica and the Cayman Islands: 37 in Grenada, 19 in Jamaica, 3 in Haiti, 4 in Venezuela, 4 in the Dominican Republic and 1 death in Tobago. Although thousands of inhabitants are fleeing, the authorities have estimated that more than 6 million people could be affected by the storm. With wind speeds still registering 225 km/h, and on a scale of 1-5 of hurricane strength, Ivan, now a type 4 hurricane, is continuing ever northwards. The effects will be felt in the oil rigs in the Gulf of Mexico, where a quarter of the American petrol and gas is produced. Whereas many are leaving New Orleans, one Betty DeCell refuses to leave because she has nowhere to go and has three historic houses in her care.	1 2 3 4 5	1 2 3 4 5

Model 11: Following the path of hurricane Ivan - which made 107 casualties in the Caribbean, hurricane Jeanne, the fourth one in the Caribbean this summer, has arrived in the Bahamas on Sunday, 18 September. The US National Hurricane Centre reports that Jeanne is gaining strength. 4 people have already died in the Dominican Republic and 2 in Puerto Rico. Around 30,000 people were evacuated in the north and north-west of the Dominican Republic. Further to the middle of the Atlantic Ocean, the sixth tropical storm of the season, Karl, can turn into a hurricane, but the NHC believes it will not hit the Caribbean or the US.

Before arriving in the Bahamas area, Jeanne had caused a lot of damage to Puerto Rico - a country that is associated to the USA, with a population of 4 million people -, where GWB declared state of emergency on Saturday so that federal resources can be sent there urgently.

On Saturday, due to the damage caused by Ivan to the south of the USA, more than 2 million people were left without electricity. Moreover, Gulf Shores was partly under up to 2 meters of water. However, such problems are little compared to the extensive damage produced in Granada and Jamaica.

	Summary	Content	Style
1	Hurricane Jean is the fourth major tropical storm in the Caribbean this summer. Jean follows Ivan which inflicted chaos in the South-Eastern States. Only a few days after the passage of Ivan caused 107 deaths in the Caribbean and United States, Jean has hit the Bahamas and is set to strengthen according to the National Hurricane Centre. Jean has already caused the 6 deaths and is heading for the Bahamas. 300,000 people have been evacuated in the North and North East of Dominican Republic. The seventh tropical storm of the season, Karl, has formed in the Atlantic and could potentially develop into a hurricane. Before reaching the Bahamas, Jean caused damage in Porto Rico, where GWB declared a state of emergency and released relief funds. Ivan caused between 4-10 billion dollars worth of damage and left almost 2 million people in 6 states without electricity. Before hitting the American coast, the hurricane killed 70 people in the Caribbean mainly in Jamaica and Grenada where 90% of the population was affected. Florida has already been severely damaged by Frances and Charley and now thousands of houses have been destroyed and thousands of security forces of have been deployed to help victims and prevent looting. Pensacola has been worst hit and is almost unrecognisable. Part of Gulf Shores is lying beneath 2 metres of water.		
2	In the wake of Ivan, it's now Jeanne's turn Jeanne is the fourth large tropical depression this summer to hit the Caribbean following in the wake of Charly, Frances and Ivan. Only a few days after the hurricane Ivan, which caused 107 deaths in the Caribbean and United States, the tropical storm Jeanne started to batter the Bahamas and is expected to get stronger. Jeanne already caused the deaths of four people in the Dominican Republic and 2 in Porto Rico. Around 300,000 people have been evacuated from their homes in the north and north-east of the Dominican Republic. Jeanne has caused much damage to homes in America in the states of Tennessee, Georgia and North Carolina. Around 2 million people were without electricity in 6 states on Saturday. Before hitting American shores, the hurricane battered the Caribbean, in particular Jamaica and Grenada.		

Appendix 3

- end-of-experiment user questionnaire -

Many thanks for having taken part in my Romanian experiment. It would be great of you could complete this (quite thorough) survey so that I know what could be improved in the future :)

Section 1: General questions about your background

1. **Which of the following languages were you familiar with before starting the course and at what level?**

French	☐ Beginner ☐ Intermediate ☐ Advanced	**Spanish**	☐ Beginner ☐ Intermediate ☐ Advanced	**Romanian**	☐ Beginner ☐ Intermediate ☐ Advanced
Italian	☐ Beginner ☐ Intermediate ☐ Advanced	**Portuguese**	☐ Beginner ☐ Intermediate ☐ Advanced		

2. **Did you use your knowledge of the above-mentioned language(s) when completing the tasks involving Romanian?**

☐ Yes ☐ No

3. **If yes, which one(s)?**

☐ French ☐ Italian ☐ Spanish ☐ Portuguese ☐ Romanian

4. **What was your initial attitude towards learning to read in Romanian?**

☐ It looked easy ☐ It looked feasible ☐ It looked difficult

5. **Have you changed your attitude in the meantime?**

☐ Yes, I am more positive about it now ☐ No, I feel the same way about it ☐ No, it is more difficult than I thought

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Section 2: General questions about the interface

1. **Do you think the resources and user interface you found at http://corpus.leeds.ac.uk/ars_rococo made completing the tasks easier for you?**

☐ Yes ☐ Yes, to some extent ☐ No

2. **How did you find the interface?**

☐ Very easy to use ☐ Relatively easy to use ☐ Difficult to use

3. **How long did it take you to get used to it?**

☐ Not long ☐ Quite long ☐ A very long time ☐ I never got used to it

4. **In the 'materials selection' section, did you use the available text-selection criteria to find other Romanian articles?**

☐ Yes ☐ No

5. **If yes, how useful did you find the criteria?**

☐ Useful ☐ Relatively useful ☐ Not useful

6. **When reading a Romanian article, how useful did you find having related articles in Romanian, French and English readily available?**

Romanian	☐ Useful ☐ Relatively useful ☐ Not useful
French	☐ Useful ☐ Relatively useful ☐ Not useful

English	☐ Useful ☐ Relatively useful ☐ Not useful

7. **How often did you refer to the related articles?**

Romanian	☐ Often ☐ Occasionally ☐ Never
French	☐ Often ☐ Occasionally ☐ Never
English	☐ Often ☐ Occasionally ☐ Never

Section 3: Questions about the concordance window

1. **Did you use the concordance window only to search for Romanian words?**

   ☐ Yes ☐ No

2. **If no, in what other languages did you perform searches?**

   ☐ French ☐ English

3. **Overall, how useful did you find the window which displays the results of your word searches?**

   ☐ Useful ☐ Relatively useful ☐ Not useful

4. **When being presented with concordances for your chosen word, how often did you look at the results in other languages, too?**

   ☐ Very often ☐ Occasionally ☐ Not often

5. **How often and how thoroughly did you study the SENTENCES representing the concordance results for the word you were looking for? How useful did you find them?**

	FREQUENCY: I studied them	**THOROUGHNESS: I studied them**	**QUALITY: I found them**
Romanian	☐ Often ☐ Occasionally ☐ Never	☐ Thoroughly ☐ Relatively thoroughly ☐ Not thoroughly	☐ Useful ☐ Relatively useful ☐ Not useful

French	☐ Often ☐ Occasionally ☐ Never	☐ Thoroughly ☐ Relatively thoroughly ☐ Not thoroughly	☐ Useful ☐ Relatively useful ☐ Not useful
English	☐ Often ☐ Occasionally ☐ Never	☐ Thoroughly ☐ Relatively thoroughly ☐ Not thoroughly	☐ Useful ☐ Relatively useful ☐ Not useful

6. How often and how thoroughly did you study the LINGUISTIC INFORMATION (in the left-hand area) relevant for the word you were looking for? How useful did you find it?

	FREQUENCY: I studied it	**THOROUGHNESS: I studied it**	**QUALITY: I found it**
Romanian	☐ Often ☐ Occasionally ☐ Never	☐ Thoroughly ☐ Relatively thoroughly ☐ Not thoroughly	☐ Useful ☐ Relatively useful ☐ Not useful
French	☐ Often ☐ Occasionally ☐ Never	☐ Thoroughly ☐ Relatively thoroughly ☐ Not thoroughly	☐ Useful ☐ Relatively useful ☐ Not useful
English	☐ Often	☐ Thoroughly	☐ Useful

	☐ Occasionally ☐ Never	☐ Relatively thoroughly ☐ Not thoroughly	☐ Relatively useful ☐ Not useful

7. **More precisely, rate the usefulness following elements which can be found in the linguistic information area:**

Lemma information	☐ Useful ☐ Relatively useful ☐ Not useful
Part-of-speech (POS) realisations of lemmas - i.e. noun, verb, etc.	☐ Useful ☐ Relatively useful ☐ Not useful
Part-of-speech (POS) tags - i.e. VP, ASN	☐ Useful ☐ Relatively useful ☐ Not useful
Indication of how many times the target word appears with a particular POS tag in the Romanian corpus	☐ Useful ☐ Relatively useful ☐ Not useful

Romanian synonyms, related words and definition	☐ Useful ☐ Relatively useful ☐ Not useful
English equivalents, related words and definition	☐ Useful ☐ Relatively useful ☐ Not useful
French equivalents and related words	☐ Useful ☐ Relatively useful ☐ Not useful
Structurally similar French words	☐ Useful ☐ Relatively useful ☐ Not useful
Collocations to the left and right of the target word, sorted by frequency	☐ Useful ☐ Relatively useful ☐ Not useful
Link between collocation information and the concordance examples illustrating that	☐ Useful

	☐ Relatively useful ☐ Not useful

Section 4: Questions about your progress

1. **After using the interface, do you feel you have acquired any knowledge about Romanian grammar and morphology?**

   ☐ A lot ☐ Some ☐ None

2. **Could you have acquired the same knowledge using available on-line materials?**

   ☐ Yes ☐ Possibly ☐ No

3. **Do you think your knowledge of French has improved as a result of being exposed to the related French articles and French concordance lines?**

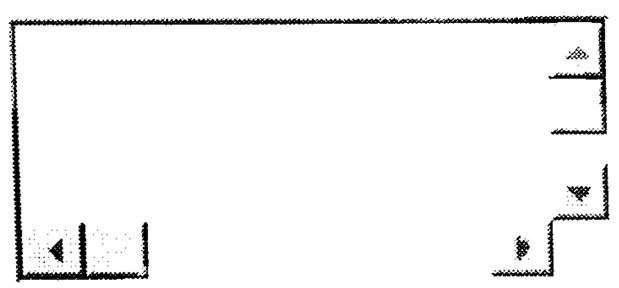
   ☐ A lot ☐ Some ☐ Not at all

Section 5: Questions about the originality and effectiveness of our approach

1. **Had you experienced a similar approach to teaching and a similar user interface before?**

☐ Yes ☐ No

2. **If yes, where and under what circumstances?**



3. **Would you recommend this approach for language learning?**

☐ Yes ☐ No

4. **Do you find such a presentation of resources engaging and motivating?**

☐ Yes ☐ No

5. **Would you use similar materials for learning other languages?**

☐ Yes, I would use such materials on their own

☐ Yes, but only in conjunction with other course materials

☐ No

6. **Compared to traditional language classes, do you feel you have made/could make progress more quickly using this approach?**

☐ Yes ☐ Possibly ☐ No

7. **Do you think that with such an approach, a user could improve his/her command of three languages, not just one?**

☐ Yes ☐ Possibly ☐ No

8. **Who do you think could benefit from such an approach in order to learn to read in a foreign language?**

☐ College students ☐ University students ☐ Professional translators ☐ Academics ☐ Adults attending evening classes

Other users - please specify:

9. **How confident are you now about learning to read in other languages using this approach?**

☐ Very confident ☐ Relatively confident ☐ Not confident

10. **If you needed to continue learning to read in Romanian using the ars_rococo resources, what would you change in your pattern of use?**

11. **Do you have any advice/comments?**