Cohesion and Comprehensibility in Swedish-English Machine Translated Texts

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Department of Culture and Communication
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By Sona Askarieh

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Supervisor: Professor Lars Ahrenberg
Linköpings Universitet
Dep. Computer science

Examiner: Professor Richard Hirsch
Linköpings Universitet

Linköping, March 2014
### Abstract

Access to various texts in different languages causes an increasing demand for fast, multi-purpose, and cheap translators. Pervasive internet use intensifies the necessity for intelligent and cheap translators, since traditional translation methods are excessively slow to translate different texts. During the past years, scientists carried out much research in order to add human and artificial intelligence into the old machine translation systems and the idea of developing a machine translation system came into existence during the days of World War (Kohemm, 2010). The new invention was useful in order to help the human translators and many other people who need to translate different types of texts according to their needs. The new translation systems are useful in meeting people’s needs. Since the machine translation systems vary according to the quality of the systems outputs, their performance should be evaluated from the linguistic point of view in order to reach a fair judgment about the quality of the systems outputs. To achieve this goal, two various Swedish texts were translated by two different machine translation systems in the thesis. The translated texts were evaluated to examine the extent to which errors affect the comprehensibility of the translations. The performances of the systems were evaluated using three approaches. Firstly, most common linguistically errors, which appear in the machine translation systems outputs, were analyzed (e.g. word alignment of the translated texts). Secondly, the influence of different types of errors on the cohesion chains were evaluated. Finally, the effect of the errors on the comprehensibility of the translations were investigated.

Numerical results showed that some types of errors have more effects on the comprehensibility of the systems’ outputs. The obtained data illustrated that the subjects’ comprehension of the translated texts depend on the type of error, but not frequency. The analyzing depicted which translation system had best performance.

### Keywords

Cohesion, Comprehensibility, Errors translations.
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Abstract

Access to various texts in different languages causes an increasing demand for fast, multi-purpose, and cheap translators. Pervasive internet use intensifies the necessity for intelligent and cheap translators, since traditional translation methods are excessively slow to translate different texts. During the past years, scientists carried out much research in order to add human and artificial intelligence into the old machine translation systems and the idea of developing a machine translation system came into existence during the days of World War (Kohenn, 2010). The new invention was useful in order to help the human translators and many other people who need to translate different types of texts according to their needs. The new translation systems are useful in meeting people’s needs. Since the machine translation systems vary according to the quality of the systems outputs, their performance should be evaluated from the linguistic point of view in order to reach a fair judgment about the quality of the systems outputs. To achieve this goal, two various Swedish texts were translated by two different machine translation systems in the thesis. The translated texts were evaluated to examine the extent to which errors affect the comprehensibility of the translations. The performances of the systems were evaluated using three approaches. Firstly, most common linguistically errors, which appear in the machine translation systems outputs, were analyzed (e.g. word alignment of the translated texts). Secondly, the influence of different types of errors on the cohesion chains were evaluated. Finally, the effect of the errors on the comprehensibility of the translations were investigated.

Numerical results showed that some types of errors have more effects on the comprehensibility of the systems’ outputs. The obtained data illustrated that the subjects’ comprehension of the translated texts depend on the type of error, but not frequency. The analyzing depicted which translation system had best performance.
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Finally, I take the opportunity to thank my parents and brothers for standing by me and sharing with me the great and the difficult moments of life. I owe them much more that I would ever be able to express, so I keep it plain and simple: Thank you so much for love and care!

Sona Askarieh
Table of Contents

Abstract.................................................................................................................................iv
Acknowledgement..................................................................................................................v
Table of Contents ....................................................................................................................vi
List of Tables ........................................................................................................................... viii
List of Figures ........................................................................................................................ xi
Nomenclature ..........................................................................................................................x

1 Introduction............................................................................................................................1
  1.1 Problem description........................................................................................................ 2
  1.2 Research question.......................................................................................................... 2
  1.3 Hypothesis .................................................................................................................... 3

2 Theoretical Background .......................................................................................................4
  2.1 Machine translation system .......................................................................................... 4
      2.1.1 Statistical Machine Translation ........................................................................... 5
      2.1.2 Methods for evaluation of the machine translations ............................................. 5
  2.2 Concept of Cohesion ...................................................................................................... 7

3 Methodology ........................................................................................................................9
  3.1 Data Collection ............................................................................................................. 9
  3.2 Translation Engine Selection ....................................................................................... 9
  3.3 Error Identification ..................................................................................................... 9
  3.4 Reference Translations ...............................................................................................10
  3.5 Comprehension Test .....................................................................................................10
  3.6 Classification and Framework of evaluation ...............................................................11
      3.6.1 Evaluation requirements .......................................................................................11
      3.6.2 Machine translation system features .................................................................12
  3.7 Error classifications .....................................................................................................14
      3.7.1 Not translated .........................................................................................................14
      3.7.2 Missing word .........................................................................................................15
      3.7.3 Incorrect word .....................................................................................................16
      3.7.4 Extra Word ............................................................................................................16
3.7.5 Incorrect word form ........................................................................................................... 17
3.7.6 Word order ............................................................................................................................. 17
3.7.7 Personal names/ proper names ............................................................................................. 18
3.7.8 Swedish proper names .......................................................................................................... 18
3.7.9 Preposition error ...................................................................................................................... 18
3.7.10 Collocations ........................................................................................................................ 19

4 Data analysis .................................................................................................................................. 19

4.1 Errors influencing comprehensibility .......................................................................................... 20
  4.1.1 Most common errors found in four translations ................................................................... 22
  4.1.2 Common errors found in translation systems ...................................................................... 23
  4.1.3 Common errors found in each translated text .................................................................... 25
  4.1.4 Conclusions .......................................................................................................................... 33

4.2 Errors influencing cohesion ....................................................................................................... 34
  4.2.1 Text 1: “Framtidens TV” (The Future TV) ......................................................................... 36
  4.2.2 Text 2: “Hyrköp” (Hire Purchase) ..................................................................................... 38
  4.2.3 Conclusions .......................................................................................................................... 40

4.3 Comprehension Test .................................................................................................................... 41
  4.3.1 Comprehension test- Text 1 ............................................................................................... 42
  4.3.2 Summary for Text 1 ............................................................................................................. 45
  4.3.3 Comprehension test-Text 2 ............................................................................................... 46
  4.3.4 Summary for Text 2 ............................................................................................................. 49
  4.3.5 The analysis of the comprehension tests .......................................................................... 50

5 Conclusion and future work ........................................................................................................... 51

6 References ....................................................................................................................................... 54

Appendixes A- Complementary Tables ........................................................................................... 56
Appendix B- Analysis of errors in the translations ........................................................................... 57
Appendix C: Analysis of Cohesion chains ........................................................................................ 93
List of Tables

Table 1-Number and Percentage of errors in the four translations ........................................22
Table 2-Number and Percentage of errors in the translations generated by Google ............23
Table 3-Number and Percentage of errors in the translations generated by Bing ...............24
Table 4-Number and Percentage of errors in the translation of Text 1 .................................25
Table 5-Table 4-Number and Percentage of errors in the translation of Text 2 ..................29
Table 6-Percentage of main and sub-groups of Cohesions for Text1 ........................................36
Table 7-Percentage of main and sub-groups of Cohesions for Text 2 .................................38
Table 8- Test results Text 1-percentage of correct answers per question (5 subjects) ..........42
Table 9- Test results Text 2- Percentage of correct answers per question (5 subjects) .......46
Table 10-Correlation between percentage of correct answers per question and number of errors per question ........................................................................................................56
List of Figures

Figure 1- Number of errors (N: 125) in two translated texts ..................................................21
Figure 2- Total numbers of cohesive chains for translations ......................................................35
## Nomenclature

### Abbreviation

<table>
<thead>
<tr>
<th>NOT TRANSLATED (NT)</th>
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<tr>
<td>NT(A)</td>
<td>Not translated article</td>
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<td>Not translated abbreviation</td>
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<td>NT(Ad)</td>
<td>Not translated adverb</td>
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<td>NT(Adj)</td>
<td>Not translated adjective</td>
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<tr>
<td>NT(Con)</td>
<td>Not translated conjunction</td>
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<td>NT(D)</td>
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<td>Missing word – abbreviation</td>
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<td>MW(Adj)</td>
<td>Missing word – adjective</td>
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<td>MW(Ap)</td>
<td>Missing word – apostrophe</td>
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<td>MW(Cl)</td>
<td>Missing word – collocation</td>
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<tr>
<td>MW(L)</td>
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<td>Missing word – personal pronoun</td>
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**EXTRA WORD (EW)**

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<td>EW(N)</td>
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<td>EW(PP)</td>
<td>Extra word – personal pronoun</td>
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**Incorrect Word Form (IWF)**

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<td>IWF(N)</td>
<td>Incorrect word form – noun</td>
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<tr>
<td>IWF(V)</td>
<td>Incorrect word form – verb</td>
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**WORD ORDER (WO)**

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<tr>
<td>WO</td>
<td>Word order</td>
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**Genitive Noun Phrase**

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<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>(GNP)</td>
<td>Genitive noun phrase</td>
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1 Introduction

The world is known as a global village as a result of accessing cheap computer devices and internet. Nowadays, many different web pages and many communication facilities are available on the internet, which internet users can access them much faster and easier than before. Thus, it is essential for many internet users, companies, and government organizations to learn foreign languages in order to understand different texts, which are available on the internet in various language. Learning all languages is a difficult and impossible task. Therefore, humans need a translator to translate foreign languages to their own local language. Since human-based translation is time consuming and expensive, the demand for a cheap, and quick translation device has increased. Therefore, a Machine Translation System has been created to meet the humans’ requirements. These days many internet users, researchers, companies, and governments organizations start to use machine translation systems. Although the Machine Translation Systems are cheaper and faster than human-based translations, they are not very accurate or dependable. Errors occur in translations, which are produced by these systems. For instance, some words are not translated to the target language or they are translated incorrectly. A methodology for evaluating the performance of the translation systems and investigating errors that affect the users’ understanding is a critical issue. The performance of the machine translations are evaluated by using linguistic knowledge in this study. The errors, which appear in the translations, are analyzed in different ways. Generally, the purpose of this work is to examine the effect of the errors on the comprehensibility and cohesion in the Swedish-English machine translated texts.
1.1 Problem description

The Swedish-English machine translation outputs are analyzed in this work. Many different features relating to the translation system should be considered throughout the evaluation process. The effects of external elements on the machine translation outputs should be analyzed. The quality of different translated texts should also be concentrated. In this work, the effects of external elements on systems outputs is ignored. Instead, the quality of systems outputs is more precisely focused. Some features of the systems outputs should also be considered. Suitability, is considered as the style of translated texts ignoring their meaning, Accuracy associates with semantic agreement between input and output texts without considering their forms, and Well-shaped deals with linguistic precision of the lexical items that are considered as separate elements. Focusing on Suitability, it is observed that some items can be judged just through comparing the human-based translations with the systems outputs. The items are comprehensibility, coherence, cohesion, and readability. Comprehensibility shows the extent to which a text as a whole is easy to understand. Coherence deals with the extent to which a reader can grasp and explains the structure of a text. “Cohesion depicts the extent to which text-internal links such as lexical chains are maintained in a translation. Finally, readability illustrates the extent to which each sentence is read naturally.” (Hovy, King, & Popescu-Belis, 2003)

1.2 Research question

The evaluation of the machine translation has various and extensive possibilities to discuss. They are narrowed down to Cohesion and Comprehensibility of the system output (narrowed down to Swedish-English translated texts). The research question is formulated as follow.

What is the relationship between comprehensibility and cohesion on the one hand, and translation errors, on the other, in Swedish-English machine translation outputs? The performances of different machine translation systems are analyzed to determine the relationship between comprehensibility and translation errors in Swedish-English machine translated texts.
1.3 Hypothesis

The hypothesis of the proposed thesis is established to forecast which factors extremely affect the quality of the translated texts. First step in this process is accomplished by categorizing errors that occur in the systems outputs. The errors classification would appear in the translation analysis in Appendix B. Gathering data for the study, It would be expected to find some relevant errors among the following types: proper/personal names, Swedish genitive noun phrase, compound verbs, Prepositions, Articles, Incorrect words choice, Collocations, Missing words, Words order, Not-translated words, and Verb concordance. Analyzing the translations, nearly all types of errors are found and then they are organized into main groups and sub-groups. An important issue is that, some errors in the translations do not actually affect the comprehensibility and can be ignored.

It is hypothesized that the errors influencing the comprehensibility of the systems outputs will extremely affect the cohesion chains in the translated texts. Moreover, it is hypothesized that there is a relationship between translation errors and their effect on comprehensibility and cohesion chains, which were broken in the systems outputs due to a translation system default. In order to reach the influence of the errors and broken cohesion chains on the comprehensibility, it would be essential to make comprehension tests. The comprehension tests are conducted to analyze comprehensibility and cohesion in the translated texts. It is expected to find a relationship between the incorrect answers and the problems of comprehension in the translations. Finding a relation between the incorrect answers and the problems of comprehension would reveal the reason for the subject’s poor understanding of the translated texts.
2 Theoretical Background

This chapter takes a brief look at analyzing the Machine Translation Systems. An introduction to this section, will clarify the reasons for the existence of various types of machine translation systems. Moreover, the concept of cohesion and different cohesion tools will be explained.

2.1 Machine translation system

Machine translation system is considered as “the traditional and standard name for computerizing systems responsible for the production of translations from one natural language to another, with or without human assistance” (Hutchins and Somers, 1992). The old version of automatic translation systems should be developed to generate a good translation. Nowadays, by increasing demands for translation among humans, companies, and other internet users in each society, it is important to develop translation systems in order to have a good quality of translations. The machine translation system should be developed because of the widespread of the internet users, globalization of business professions, which people advertise and sell their products on the internet without offering any translation. Therefore, there are enormous demands to translate foreign languages. Since old version of the translation systems were not able to translate a text correctly, the translated text should be revised by human translators that was time-consuming and costly job. During the 1990s, many producers of translation systems offered online translation services for the internet users. The primary machine translation system was the Systran, which was used by the US Air Force in order to translate information from Russian to English. Rapidly increasing the use of free online Internet webpages leads to free advanced, and quick online translation services, Google and Bing, to be produced. Moreover, the Machine Translation services are used as a translator system in social interactions like electronic-emails and chat rooms. The automatic translation systems can also be used as a helpful tool for language learning. Actually, many other machine translation engines and computer-based translation devices for the use of human translators, electronic dictionaries, and lexicon management systems, available that are considered as translator workstations (Hutchins, 2003).
2.1.1 Statistical Machine Translation

Peter F. Brown has done a research about Statistical Machine Translation (SMT) on a Candid system at IBM and has shown that Statistical Machine Translation relates to translation of one natural language into another one by applying computers (Brown et al., 1990). The Statistical Machine Translation is considered as a device, which evaluates a translated text based on the statistical models. The parameters are calculated based on the analysis of the translated text. Moreover, the Statistical Machine Translation can translate a text automatically by evaluating of human-base translated texts. Therefore, the Statistical Machine Translation can translate a huge amount of previously translated texts, which are called parallel corpus, to other languages. This means that Statistical Machine Translation can translate previously unseen texts. According to the above assessments, with a set of SMT tools and sufficient amount of parallel text, the Statistical Machine translation system can produce a translation for a new language pair in a short time. The quality of the performance of the statistical machines “depend significantly on quantity; quality, and domain of the data, but there are many tasks for which even translation output is useful” (Lopez, 2008).

An important problem associating with this approach is that it needs a great amount of information to give a valid statistical data from where the data is gained. According to Bennett and Gerber, one million bilingual sentence pairs is a good size of a training set for a Statistical Machine translation system to produce an accurate translation in a short time (Bennett and Gerber, 2003). The Statistical Machine translation system needs a large amount of memory and great power of processors to translate correctly in accurate time.

2.1.2 Methods for evaluation of the machine translations

Evaluation before, during, and after the performance of a machine translation is essential. The evaluation of the machine translation outputs is a complicated process. There are, of course, many various approaches to evaluate a machine translation system outputs. In the following part, some of them are described.

The first admitted procedure to analyze the machine translation performance is investigating the machine translation system by humans. In this way, humans give the correctness degree to a translation according to the quality of the transferred message and meaning from the source language, and a facility for offering the meaning in the target language (White, et al.
In comparison to this, another process evaluates the quality of a humans’ understandability when they use a machine translation to translate a text. In this way, *Evaluation of Machine Translation* performance is conducted through some questions, which are asked from humans based on a translated text. The experiment was successful; the validity of the answers permitted to measure the amount of the comprehensibility of the target text. The approach in order to evaluate the performance of the machine translation system was good, but it needs many requirements, for instance, “being time efficient or requiring small amount of post-editing, to be considered convincing” (Wojak & Graliński, 2010). Unfortunately, the previous resolutions to evaluate the machine translation system outputs consume much time and money so that makes them partly impossible. From 2000 until now, the old versions of metric approaches have improved to the automatic metric systems. The new metric systems work in a way that “the closer these metrics are to the real objective, the better the performance on that objective will be” (Lopez, 2008). Some of the metric systems are explained in the next part.

### 2.1.2.1 Automatic metric systems

An automatic metric system evaluates a translation by comparing between an automatic translation system’s output and a translation produced by a human. The human-based translation is so-called *Reference translation*. In this way, if a machine translation’s output and a reference translation of a similar part closely resemble each other, the metric system considers it as a good translation. It is important to note that different machine translation systems produce different translations for the same text so that all of them can be correct. Therefore, “in order to have multiple possible good translations, several reference translations should be supplied” (Lopez, 2008).

The primary metric system was *BLEU (the Bilingual Evaluation Understudy)*, which was used by the IBM group. The BLEU metric system evaluates a translation based on an algorithm that analyzes the quality of a translation machine’s outputs. Indeed, the BLEU system compares a system’s output with a human-based translation in order to evaluate the performance of the translation machine. The *National Institute for Standards and Techniques* (NIST) developed another metric device in which a system’s outputs were analyzed based on individual word alignments (Papineni et al. 2002). In contrast with them, the *Statistical Machine Translation* (SMT) is a metric system, which a human gives a grade to machine
translation’s output. It can be said “the total value of these metrics for evaluating of machine translation system is mostly seriously questioned” (Hutchins, 2003). The general feature of the automatic evaluation machine offers some points for parts of a sentence, even if the whole sentence is not understandable for translation adequacy and if it is not reflected by appropriate word sequences (Wojak and Graliński, 2010). The relation between an automatic evaluation and an evaluation by humans is significant. The relevant studies about the optimum use of a metric system should continue in order to gain maximum efficiency of the metric system. Therefore, “an attempt for improvement of metric evaluation presented within the metric calling METEOR introducing the scoring synonyms” (Lavie and Agarwal, 2007).

The METEOR system is designed to improve automatic evaluation of machine translation quality. The METEOR system evaluates a machine translation’s output by comparing between the translation generated by the machine translation and a reference translation based on word-to-word matches. The Translation Edit Rate (TER), another metric system, counts the amount of post-editing that are conducted by the humans until they agree with the reference translations. Nevertheless, the evaluation of the automatic translation system has a considerable effect on the improvement of a statistical machine translation, and should be continued. It should be considered that, with the increasing the metric systems, it is sometimes difficult to decide which one to use (Lopez, 2008).

2.2 Concept of Cohesion

According to M.A.K. Halliday and Ruqaiya Hasan, a cohesion is considered as a non-structural resource in the correlation between lexical and grammatical category, which maintains parts of a text together and makes it meaningful (Halliday and Hasan 1976).

Halliday classifies a cohesion to five main groups. First one, Reference is considered as an element in the text, which becomes a referent for other element that follows. Reference divides into sub-groups: Anaphoric/ Cataphoric Reference, and Personal/ Comparative/ Demonstrative Reference. Second, Ellipsis associates with a clause or a part of it that can be presumed and is deleted in the following section in the text. The previous assessed gap that is made by omission, may be filled by an item signaling this gap and is called Substitution chain. The other type of the cohesive elements, Lexical organization, establishes continuity in a text by the choice of words, either by repetition or by choice of a word that is related to the previous part, Semantically or Collocationally. Lexical organization includes some sub-
groups: Repetition/ Synonym/ Antonym/ Meronym/ Co-meronym/ Hyponym/ Holonym/ Co-nyponym/ Holonym, and finally Conjunction. From the other point of view, Lexical organization, is defined as a clause or bigger parts of a text when are joined together by a Conjunction. Conjunction divides into additive/ adversative/ causal/ and temporal (Halliday, 1985).

Sagi describes a Local Coherence as “linguistic theories of discourse comprehension, which often focus on the role of discourse relations in the establishment of local coherence through the process of determining the manner by which two successive discourse segments relate to one another” (Sagi, 2000). Regarding this assessment, Local coherence is described as correlations between sentences of a textual succession.

From Van Dijk’s point of view, Global coherence is defined as the whole collection of sentences for the discussion as a whole. Moreover, it is defined as theme, idea outcome, or summary of a discussion. It is built precisely in terms of Semantic Macrostructures. The Semantic Macrostructures are calculated from an arrangement of a text, are so-called Macro-rules, which choose or omit information, generalize, or create more embracing propositions. “Macrostructures, counting for the global coherence of a text, are also necessary as the basis for local coherence relations.” (Van Dijk, 1980)
3 Methodology

The aim of this chapter is to provide the criteria of selecting data and a translation engine. The process of error identification and classification, which is identified by different devices like reference translation, will be clarified. Moreover, comprehension tests and various type of the cohesion chains will be analyzed.

3.1 Data Collection

In order to collect the data, two texts are used. The texts are considered as the input items to the machine translation systems. The texts were taken from home service and information in Stångåstaden page. Both texts have translated by two different types of the translation systems, Google and Bing. Therefore, four translations are generated.

3.2 Translation Engine Selection

Two popular translation engines, Google and Bing, are utilized. Google translate is the most popular and easily accessible with users. Bing translate system is used by applicants in Microsoft applications and on the internet. After the systems outputs are gathered, they are organized in different groups based on the number of errors that are found in each translation.

3.3 Error Identification

Errors are identified through two different stages. First stage associates with identification types of errors, which influence the comprehension of the systems outputs. This type of error divides into Missing words, Incorrect words, Words alignment, Not-translated words, Word order. The other stage relates to different type of the cohesion. Cohesion divides into Conjunction, Reference, Repetition, and Semantics relations. In accordance with the whole number of the errors, the systems outputs are classified. Then, the cohesive chains, which appear in the translated texts, are analyzed. Moreover, how the errors affect the cohesive chains and cause the cohesion to be broken, are investigated. Finally, the maintenance of the cohesive chains in the translated texts are evaluated.
3.4 Reference Translations

It is useful to have a reference translation to compare the machine translation outputs with an accurate translated text to find out the errors in the translated text generated by the machine translation system. Certainly, various accurate human-based translations, reference translations, are attainable. The various reference translations can be useful in order to evaluate and compare the systems outputs. In this study, each translated text is considered as the reference translation. Therefore, two reference translations are available. The translations are also utilized as the basis texts for the comprehension tests.

3.5 Comprehension Test

The following comprehension tests are prepared to evaluate humans’ comprehension of systems outputs. The two Swedish texts, Text1: “Framtidens TV” (about the future Televisions equipment) and Text2: “Hyrköp” (related to Hire Purchase) are translated by the two various translation systems. The comprehension tests are made based on the translated texts.

3.5.1 Tests Design

The comprehension tests consist of four questions for each text that should be answered according to the translated texts. The persons should read two various translated texts generated by the two different systems but the type of machine translation engines are not presented to them. Ten non-native speakers of English who do not understand Swedish read the two different translated texts produced by the different translation systems and then answered related questions.

The questions of the tests include three different levels.

Level 1: Easy- requiring short answers and needing one or two words to write down.

Level 2: Average Difficulty- requiring an answer in about one or two sentence and the key word should be presented in the answer.

Level 3: Difficult- these questions should be answered by more than one idea mentioned in translated texts, which sometimes are found in different places.
Finally, the answers are evaluated according to the reference answers, which are arranged as accurate answers. In this way, the correct answers are signed as ‘1’ while the wrong answers are signed as ‘0’ in the tables.

The aim of conducting the tests is to find a relationship between the wrong answers and problems with the cohesion in the translated texts. To achieve this goal, the parts in which the subjects have understanding problems, are identified. Then a relation between the subjects’ problem and broken cohesive chains in similar parts of the translated text is found. The evaluation of these processes probably illustrates which category of the errors has more effect on the comprehensibility of the systems outputs.

3.6 Classification and Framework of evaluation

A simple model is used to categorize the examples of the evaluations. The simple model is taken from a quality model, which is presented in an article: Principles of Text-Based Machine Translation Evaluation (Hovy, King, & Popescu-Belis, 2003). The process is shown in the following sections.

3.6.1 Evaluation requirements

3.6.1.1 The aim of evaluation

The aim of the evaluation is to recognize how cohesion and comprehensibility are preserved in the Swedish-English translations. To show this, the way that translations are generated and the performance of the engines are evaluated.

3.6.1.2 Advantage of evaluation

An advantage of evaluation is to perceive whether the machine translation engines can be utilized successfully in order to translate the valuable data. Furthermore, it shows whether the cohesion of the texts is maintained in the translated texts generated by the machine translation systems.
3.6.1.3 Object of evaluation
Examination and evaluation of the translation systems at the current stage and distinguishing its usage is called Object of evaluation. In this work, the Swedish-English translation systems are assumed as complete translation devices. Two Objects of evaluation are utilized.
Google translate system (S1)
http://translate.google.com/#en/fa/consider
Bing translate system (S2)
http://www.bing.com/translator

3.6.1.4 Characteristics of the translation task
Specification of the translation task refers to the information, which is predesigned for the translation system, and the human’s point of view who attains the translation. The characteristics contain different parts: Assimilation, Dissemination, and Communication. Assimilation refers to the information that focus on the type of data, which may be used by people moving to Sweden without advanced knowledge of Swedish. Dissemination associates with sending unfamiliar information in acceptable quality translations required the applicants to achieve benefit from the translated texts. Finally, Communication relates to the quality of translations that must be good enough to be an understandable dialogue that occur between immigrants and Swedish residents.

3.6.1.5 Applicants features
Machine translation system consumers: Here in Sweden the users of the machine translation systems are non-native speakers of English who do not understand Swedish who have the basic or do not have any knowledge of Swedish language, but they are aware of the machine translation systems.
The machine translations users who participated in the comprehension tests are non-native speakers of English who do not understand Swedish.

3.6.2 Machine translation system features
The following part clarifies how the comprehensibility and cohesion are preserved a standard level in the discourse.
3.6.2.1 Linguistic methods and efficiencies:
Two Languages are utilized in this research. The Swedish and English languages are considered as linguistics resources and efficiencies.

3.6.2.2 Features of current procedure:
- Translation arrangement tasks
  The two texts are taken from the websites; then each text is translated by two different and popular translation systems, which leads to a comparative evaluation of the translation systems outputs.

- Tasks relates to post-translation
  System outputs are analyzed to determine errors that emerge in each translated text. The different features of the systems outputs are investigated. The comprehensibility, which focuses on all types of errors, is evaluated. Then, cohesion, which concentrates on cohesive chains and devices, is analyzed.

- Mutual translation tasks
  Conduct comprehensibility tests by human subjects in order to evaluate the Comprehensibility of the translated texts.

3.6.2.3 Features of external part of a system:
The systems external features can be divided into some parts, which are described below.

- **Suitability:**
  Target language just contains Swedish language.
  - Readability: not analyzed
  - Cohesion: evaluated for both of the translation systems
  - Style: not analyzed
  - Comprehensibility: evaluated for both of the translation systems
• **Well-shaped**
According to the errors classification: Incorrect word, Syntax, and morphology; Word choice is evaluated in the comprehensibility inquiry.

• **Availability**
Concerning this feature, it is clear that every translation engine is easy to use and easily available.

• **Proficiency**
This feature relates to time manner and system’s speed. The two chosen systems are quick enough.

### 3.7 Error classifications

Errors are divided into six major groups: Missing Word (MW), Incorrect Word (IW), Not Translated (NT), Word Order (WO), Extra Word (EW), and Incorrect Word Form (IWF). The major groups of the errors are described in the following part.

#### 3.7.1 Not translated

In the translation process, some elements are not translated by the machine translation system. The untranslated elements are considered as Not-translated words. Most Not-translated word errors relate to nouns that are not identified by the translation systems, for instance:

**Example (Text 2):**
Hushåll med osäker ekonomisk utvecklig.

**Translated (S1):**
“Households with uncertain economic utveckling.”

**Not-translated words:**
The ‘utvecklig’ should be translated to ‘growth’
Corrected form:
“Households with uncertain economic growth”

3.7.2 Missing word

Some words are not mentioned in the translated text. The errors are called Missing words error and are organized into two types:

a) The first category is the absence of the words that change the meaning of the sentence. Regularly, this kind of error occurs by omitting main words such as verbs and nouns (Vilar et al. 2006). The error can be observed in the following example:

Example (Text 2):
“Hyr först och köp sen, om du vill.”

Translated (S2):
“Rent first and then, if you want to.

Missing Word:
The missing word is the verb ‘buy’ that should be written down after ‘then’ in order to have meaningful sentence.

Corrected form:
“Rent first and then buy, if you want to.”

b) The second type associates with the absence of the words that do not change the meaning of the sentence, but they are essential to have a correct grammatically sentences (Vilar et al. 2006).

Example (Text 2):
“Annars fortsätter du att hyra, (…).”

Translated (S1):
“Otherwise, continue to rent, (…).”

Missing Word:
The missing word is pronoun ‘you’ before ‘continue’ that should be mentioned.

Corrected form:
“Otherwise, you continue to rent, (…).”
3.7.3 Incorrect word

This case relates to choose the wrong lexical unit by the machine translation so that the correct meaning of the sentence can be lost sometimes.

An example of Incorrect word error can be found in the Text 2, which has been translated by Google translate system:

Example (Text 2):
“(…) där vi tar den ekonomiska risken och du som hyresgäst får valfriheten.”

Translated (S1):
“(…) where we take the financial risk and as a tenant you may choice.”

Incorrect word:
Incorrect word, ‘valfrihet’ is ‘freedom of choice’ not just ‘choice’, so ‘får valfriheten’ should be rendered as ‘get the freedom of choice’.

Corrected form:
“(…) where we take the financial risk and you as a tenant get the freedom of choice.”

3.7.4 Extra Word

Sometimes the Machine translation system generates additional words that do not exist in the main text. This type of mistake is known as Extra Word. The example is taken from the Text1 translated by the Bing translate system.

Example (Text 1):
“Framtidens TV”

Translated (S2):
“The Future of TV”

Extra Word:
Preposition ‘of’ and article ‘the’ are considered as extra words.

Corrected form:
“Future TV”
3.7.5 Incorrect word form

This kind of error is created by incorrect agreement of verbs and subjects but it does not have an important influence on the concept of the sentence. This type of error is shown in the following example.

Example (Text 2):
“Par som är på väg attilda familj men som inte har bestämt sig var eller hur man vill bo.”

Translated (S2):
“Couples who are about to start a family but has not decided where or how you want to live.”

Incorrect word form:
In this case, Incorrect words form are ‘has not’ that should be replaced with ‘have not’ and ‘you’ that should be changed to ‘they’

Corrected translation:
“Couples who are about to start a family but have not decided where or how they want to live.”

3.7.6 Word order

The basic word order structure in Swedish language is Subject-Verb-Object (SOV), which is similar to English. But in Swedish, this structure can be changed so that a simple sentence may be written down in different forms. The change of the word order that sometimes happen in the translations is called Word order error. The word order error is illustrated by the following example, which is taken from Text 1 translated by the Bing translation system:

Example (Text 1):
“Med hjälp av fjärrkontrollen klickas meddelandet fram för läsning.”

Translated (S2):
“With the help of the remote control is clicked the message for reading.”

Incorrect word order:
In this case, ‘the message’ is in wrong place and should be written down before ‘is clicked’ in order to have a correct word order.

Corrected form:
“The message is clicked for reading with the help of the remote control.”
Considering the main errors groups, it is also reasonable to look at the Sub-groups. The Sub-
groups can also generate other kinds of errors that some of them are classified in the
following section.

3.7.7 Personal names/ proper names

Proper names constitute a major part of words in each natural language and they sometimes
do not affect the comprehensibility of translated text. The usage of proper names differ from
common nouns. For instance, the Stångåstadens offers necessary options for leasing
opportunity and among those, the personal names are the most peculiar class of proper
names.

3.7.8 Swedish proper names

Not-translated error mostly relating to a proper noun, and sometimes to a compound noun,
which are not translated by a machine translation system. This type of the error rarely affects
the understanding of a translated text. The following example shows this error.

Example (Text 1):
“(…) via Stångåstadens Boendetjänster i Framtidens TV.”

Translated (S1):
“(…) through Stångåstadens’s Accommodation Services in Future TV”

Not-translated words:
Not-translated proper name is ‘Stångåstadens’ which the first one is a proper noun.

Corrected form:
“(…) through Stångåstadens’s Accommodation Services in Future TV”

3.7.9 Preposition error

A preposition makes a correlation between words in a sentence. Therefore, missing it
sometimes causes the meaning of the sentence to be changed.
3.7.10 Collocations

“Collocations, in their vast majority, are made of frequently used terms, often highly ambiguous (e.g., break record, loose change) in English” (Wehrli, Seretan, & Nerima, 2010). Similarly, “Collocation (...) for lexical cohesive relations differs from what is meant by collocation in corpus linguistics. In corpus linguistics, collocation refers to co-occurrences of words in the particular texts. Many of these words co-occur in a fixed syntactic pattern (e.g. make an improvement; a high/ enormous/ greater/ large/ mild/ reasonable/substantial degree of…)” (Stubbs, 2001). Therefore, in similar texts there is a collocation in lexical cohesiveness between words. The reason for encountering the two various definitions of the term is that in lexical cohesiveness co-occurrence of elements is not an adequate proof. The Lexical elements are analyzed with a concept connection between them that “tend to occur in similar lexical environments because they describe things that tend to occur in similar situations or texts in the world” (Morris & Hirst, 1991, p. 22). With no doubt, there are many of these co-occurrences words in Swedish language regarding to its fixed syntactic pattern, for instance, ‘drabbas av sjukdom’, ‘fastställt pris’, and ‘ekonomiska risken’. Analyzing the translations show that some types of errors affect these Lexical units so that they are not considered as a collocations. This can be seen by the following example.

Example (Text 2)

“You may be experiencing illness, (…)."

Translated (S1)

“You may suffer from illness, (…).”

Incorrect Word Error, which affect a collocation

The collocation ‘drabbas av sjukdom’ has been translated to ‘experiencing illness’ that is not correct and is not considered as a collocation. Incorrect Word error cause the Swedish collocation, ‘drabbas av sjukdom’, to be translated incorrectly.

Correct form

“You may suffer from illness, (…).

4 Data analysis

Translating the two texts by the two different machine translation systems give the opportunity to recognize and analyze the errors that occur in the translated texts. Analyzing
the errors allow us to examine whether the comprehensibility of the translated texts are preserved in the translated texts and what types of the errors have most amount in the translations. The analyses are started by classifying the errors to six main groups and distinguishing, which mostly affect the translated texts. The results of the evaluations were shown in Table 1 and Table 2. Then, the cohesive chains are divided into four main groups. The fond cohesive chains are presented in Table 4 attached in Appendix A, in which the number of the cohesion chains and the total number of broken chains in each translated text are illustrated. Finally, comprehension tests are conducted. The aim of the tests is to examine comprehensibility of the two translated texts. In the next section, the statistical results of the above analysis are represented. The following abbreviations are used to refer to each system and text.

*System 1(S1)* refers to Google translate system
*System 2(S2)* refers to Bing translate system

The Swedish texts are presented as:
*Text1* - “Framtidens TV” that is about (the future TV)
*Text 2* - “Hyrköp” that is about (Hire/Lease purchase)

### 4.1 Errors influencing comprehensibility

The errors which affect the comprehensibility of the machine translation outputs are categorized into three sub-groups. The first sub-group relates to errors that are produced in expressions in general. The next one includes errors, which occur in various translation engines. The last sub-group embraces the errors that are specified for each text. The main groups of errors are divided into *Missing Word (MW)*, *Incorrect Word (IW)*, *Not Translated (NT)*, *Word Order (WO)*, *Extra Word (EW)*, and *Incorrect Word Form (IWF)*. The number of each main error for each translated text is shown in the following tables.
Figure 1- Number of errors (N: 125) in two translated texts

Text 1

Future TV

<table>
<thead>
<tr>
<th>Type of error</th>
<th>Number of errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>MISSING WORDS</td>
<td>Google: 1</td>
</tr>
<tr>
<td></td>
<td>Bing: 3</td>
</tr>
<tr>
<td>WORD ORDER</td>
<td>Google: 0</td>
</tr>
<tr>
<td></td>
<td>Bing: 2</td>
</tr>
<tr>
<td>INCORRECT WORDS</td>
<td>Google: 9</td>
</tr>
<tr>
<td></td>
<td>Bing: 11</td>
</tr>
<tr>
<td>NOT-TREATED WORDS</td>
<td>Google: 1</td>
</tr>
<tr>
<td></td>
<td>Bing: 2</td>
</tr>
<tr>
<td>INCORRECT WORD FORM</td>
<td>Google: 3</td>
</tr>
<tr>
<td></td>
<td>Bing: 7</td>
</tr>
<tr>
<td>EXTRA WORDS</td>
<td>Google: 4</td>
</tr>
<tr>
<td></td>
<td>Bing: 8</td>
</tr>
</tbody>
</table>

Text 2

Hire Purchase

<table>
<thead>
<tr>
<th>Type of error</th>
<th>Number of errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>MISSING WORDS</td>
<td>Google: 7</td>
</tr>
<tr>
<td></td>
<td>Bing: 7</td>
</tr>
<tr>
<td>WORD ORDER</td>
<td>Google: 4</td>
</tr>
<tr>
<td></td>
<td>Bing: 1</td>
</tr>
<tr>
<td>INCORRECT WORDS</td>
<td>Google: 8</td>
</tr>
<tr>
<td></td>
<td>Bing: 2</td>
</tr>
<tr>
<td>NOT-TREATED WORDS</td>
<td>Google: 6</td>
</tr>
<tr>
<td></td>
<td>Bing: 2</td>
</tr>
<tr>
<td>INCORRECT WORD FORM</td>
<td>Google: 2</td>
</tr>
<tr>
<td></td>
<td>Bing: 5</td>
</tr>
<tr>
<td>EXTRA WORDS</td>
<td>Google: 7</td>
</tr>
<tr>
<td></td>
<td>Bing: 9</td>
</tr>
</tbody>
</table>
4.1.1 Most common errors found in four translations

The number of errors as well as the ratio of every error to the total errors in percent are presented in the following table. According to the table, it is obvious that the most common error belongs to Incorrect Word with 30% while Word Order has the lowest percentage of errors, 6% in the four translation.

<table>
<thead>
<tr>
<th>TYPE OF ERROR</th>
<th>NUMBER</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>INCORRECT WORD</td>
<td>37</td>
<td>30%</td>
</tr>
<tr>
<td>EXTRA WORD</td>
<td>27</td>
<td>21%</td>
</tr>
<tr>
<td>MISSING WORD</td>
<td>28</td>
<td>22%</td>
</tr>
<tr>
<td>INCORRECT WORD FORM</td>
<td>15</td>
<td>12%</td>
</tr>
<tr>
<td>NOT-TRANSLATED WORD</td>
<td>11</td>
<td>9%</td>
</tr>
<tr>
<td>WORD ORDER</td>
<td>7</td>
<td>6%</td>
</tr>
<tr>
<td>SUM</td>
<td>125</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 1-Number and Percentage of errors in the four translations
4.1.2 Common errors found in translation systems

The most frequent error groups for each translation engine are discussed according to Figure 1 in the following part.

4.1.2.1 Google Translation System

The quality of Google translate system is evaluated by analyzing its translations in this part. According to the error analysis, it is obvious that both translations are influenced by different types of errors. Based on the following table, the most influenced one being Text 2 with 70%, whereas Text 1 being the least influenced by the errors, 30%. Generally, it can be said that Google translate system produced the best translation in the case of Text 1.

<table>
<thead>
<tr>
<th>TYPE OF ERROR</th>
<th>TOTAL NUMBER</th>
<th>TOTAL PERCENTAGE</th>
<th>PERCENTAGE OF TEXT 1</th>
<th>PERCENTAGE OF TEXT 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>INCORRECT WORD</td>
<td>17</td>
<td>35%</td>
<td>18%</td>
<td>17%</td>
</tr>
<tr>
<td>EXTRA WORD</td>
<td>10</td>
<td>20%</td>
<td>6%</td>
<td>14%</td>
</tr>
<tr>
<td>MISSING WORD</td>
<td>8</td>
<td>17%</td>
<td>2%</td>
<td>15%</td>
</tr>
<tr>
<td>INCORRECT WORD FORM</td>
<td>3</td>
<td>6%</td>
<td>2%</td>
<td>4%</td>
</tr>
<tr>
<td>NOT-TRANSLATED WORD</td>
<td>7</td>
<td>14%</td>
<td>2%</td>
<td>12%</td>
</tr>
<tr>
<td>WORD ERROR</td>
<td>4</td>
<td>8%</td>
<td>0</td>
<td>8%</td>
</tr>
<tr>
<td>SUM</td>
<td>49</td>
<td>100%</td>
<td>30%</td>
<td>70%</td>
</tr>
</tbody>
</table>

Table 2-Number and Percentage of errors in the translations generated by Google
4.1.2.2 Bing Translation System

Investigating the performance of Bing translate system shows that the most frequent errors are mostly similar to Google translate system. The following table shows the extent to which the errors affect both translated texts. In the case of both translations, the most frequent error is Incorrect Word, which consists 30% of all errors in the translations. From the tables, it is clear that the amount of errors that occur most frequently in both translated texts are nearly similar. It can be said that Bing translate system produced better translation, with less error, for Text 1.

<table>
<thead>
<tr>
<th>TYPE OF ERROR</th>
<th>TOTAL NUMBER</th>
<th>TOTAL PERCENTAGE</th>
<th>PERCENTAGE OF TEXT 1</th>
<th>PERCENTAGE OF TEXT 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>INCORRECT WORD</td>
<td>20</td>
<td>30%</td>
<td>17%</td>
<td>13%</td>
</tr>
<tr>
<td>EXTRA WORD</td>
<td>17</td>
<td>26%</td>
<td>12%</td>
<td>14%</td>
</tr>
<tr>
<td>MISSING WORD</td>
<td>10</td>
<td>16%</td>
<td>4%</td>
<td>12%</td>
</tr>
<tr>
<td>INCORRECT WORD FORM</td>
<td>12</td>
<td>18%</td>
<td>10%</td>
<td>8%</td>
</tr>
<tr>
<td>NOT-TRANSLATED WORD</td>
<td>4</td>
<td>6%</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>WORD ERROR</td>
<td>3</td>
<td>4%</td>
<td>3%</td>
<td>1%</td>
</tr>
<tr>
<td>SUM</td>
<td>66</td>
<td>100%</td>
<td>49%</td>
<td>51%</td>
</tr>
</tbody>
</table>

Table 3-Number and Percentage of errors in the translations generated by Bing
4.1.3 Common errors found in each translated text

Each translated text is individually analyzed based on the most frequent error types, which occur in the translation generated by each translation system. The main groups of errors for each translation is shown through some examples relating to data evaluation in the following part. Analyzing the main groups of errors for each text is presented in Appendix B.

4.1.3.1 Future TV (Text 1)

The following table illustrates the amount of errors that occurred in the translations of Text1 generated by Google (System 1) and Bing (System 2). It can be said that, in the case of Text1 System 1 has the best performance. The most common errors, which occur in the translated Text 1 generated by both translation systems, contain Incorrect Words and Extra Words. The text is analyzed based on the most frequent error types, which occur in the translation generated by each translation system in the following part.

<table>
<thead>
<tr>
<th>TYPE OF ERROR</th>
<th>TOTAL NUMBER</th>
<th>TOTAL PERCENTAGE</th>
<th>PERCENTAGE OF SYSTEM 1</th>
<th>PERCENTAGE OF SYSTEM 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>INCORRECT WORD</td>
<td>20</td>
<td>42%</td>
<td>19%</td>
<td>23%</td>
</tr>
<tr>
<td>EXTRA WORD</td>
<td>11</td>
<td>23%</td>
<td>7%</td>
<td>16%</td>
</tr>
<tr>
<td>MISSING WORD</td>
<td>4</td>
<td>8%</td>
<td>2%</td>
<td>6%</td>
</tr>
<tr>
<td>INCORRECT WORD FORM</td>
<td>8</td>
<td>17%</td>
<td>2%</td>
<td>15%</td>
</tr>
<tr>
<td>NOT-TRANSLATED WORD</td>
<td>3</td>
<td>6%</td>
<td>2%</td>
<td>4%</td>
</tr>
<tr>
<td>WORD ERROR</td>
<td>2</td>
<td>4%</td>
<td>0</td>
<td>4%</td>
</tr>
<tr>
<td><strong>SUM</strong></td>
<td><strong>48</strong></td>
<td><strong>100%</strong></td>
<td><strong>32%</strong></td>
<td><strong>68%</strong></td>
</tr>
</tbody>
</table>

*Table 4-Number and Percentage of errors in the translation of Text 1*
As we can see, Incorrect Words comprise around 42% of all errors in the case of the two translations of Text 1 that are generated by two translations systems. The number of Incorrect Words error relating to System 1 reaches to 18% and System 2 represents 22% of all errors in the translations of text1. This kind of error mostly relates to prepositions, adjectives, nouns, and verbs so that the meaning of the sentences may be changed in some cases.

This feature is shown by the following example that is taken from the Text 1 generated by System 1.

**Example (Text 1):**
“En lättare vardag med Framtidens TV”
*Translated (S1):*
“A minor living with Future TV”
*Incorrect word:*
The source sentence is in Swedish and is translated to ‘A minor living with Future TV’ that is not correct and should be translated to ‘An easier daily life with future TV’.
*Corrected form:*
“An easier daily life with Future TV”

The next most frequent error is Extra Word, which represents 23% in the case of the two translations of Text 1. The amount of error for the translations by System 1 and System 2 is 6% and 16% consequently. The following example is taken from translated Text 1 by System2 shows this feature.

**Example (Text 1):**
“(…) i Framtidens TV”
*Translated (S2):*
“(…) in the Future of TV”
*Extra Word:*
Preposition ‘of’ and article ‘the’ are extra.
*Corrected form:*
“(…) in Future TV”

The third most frequent error associates to Incorrect Word Form. This error contains 16% of all errors in the case of the two translations generated by two systems. The amount of this
error in the translation generated by System 1, is 2%, and in the case of System 2 contains 14% of all errors. The following example shows this error.

Example (Text 1):
Uppgifterna om elförbrukningen lämnas av Tekniska Verken och det är bara du som kan se dina egna värden.

Translated (S2):
“The data on electricity consumption supplied by Technical Office and it is only you who can see your own values.”

Incorrect Word Form:
Incorrect word form is the Swedish verb ‘lämnas’ that should be translated to ‘is supplied’ instead of ‘supplied’

Corrected form:
The data on electricity consumption is supplied by Technical Office and it is only you who can see your own values.

The type of error relating to Missing Words consists 8% of all errors in the two translations. They show 2% in the case of System 1 and 6% in the case of System 2. This kind of error, even if it relates to prepositions, causes the meaning of the sentence to be changed. This feature is shown in the following example that is taken from translated Text 1 generated by System 2.

Example (Text 1):
“I Framtidens TV (…) kan du nu se statistik över din förbrukning av hushållsel.”

Translated (S2):
“Future TV (…) you can now view statistics on your consumption of household electricity”

Missing word:
According to the sentences above, it is observed that ‘In’ is considered as Missing Word and should be mentioned.

Corrected form:
“In Future TV (…) you can now view statistics on your consumption of household electricity.”
Finally, the other two frequent errors associate to *Not-Translated Word* and *Word Order*. The first one relating to *Not-Translated Words*, represent 6%, in both translations, 2% and 4% by in the cases of System 1 and System 2 respectively. In fact, this type of error mostly relates to some proper names that are not translated and may cause readers to be confused. The second one, *Word Order*, includes 4% of all errors in the translation generated by System 2. In the case of System 2, the amount of this error reaches 4%, which is in contrast with System 1 where this type of error does not occur at all. These two types of errors are shown subsequently through the following examples. *Not-Translated Word* error is shown by the example that is taken from System 1.

**Example (Text 1):**

“Genom en symbol i zapbaren, den remsa som kommer upp vid byte av tv-kanal, går det att se att ett nytt meddelande väntar.”

**Translated (S1):**

“Through a symbol in zapbaren, the strip that comes up when changing the TV channel, you can see that a new message is waiting.”

**Not translated phrase:**

In this case, ‘Zapbaren’ is not translated.

**Corrected form:**

“Through a symbol in the strip that comes up when changing the TV channel, you can see that a new message is waiting.”

In the case of *Word Order*, the example is taken from the translation generated by System 1.

**Example (Text 1):**

“Ta kontakt med Com Hem's kundservice på det för Framtidens TV speciella telefonnumret 0775-17 17 17 så kan de hjälpa dig. läsning.”

**Translated (S1):**

“Get in touch with Com Hem's customer service (...) for future television special phone number 0775-17 17:17 so they can help you.”

**Incorrect word order:**

Incorrect Word order is ‘for future television’ that should be preceded ‘service’

**Corrected form:**

“Get in touch with Com Hem's customer service for Future TV (...)special phone number 0775-17 17:17 so they can help you.”
It can be seen from the above analysis that the amount of errors in translated Text 1 generated by both translation systems have never reached more than, on average, 20% in all translations. This amount is not considerable but some of errors have affected some of the sentences of the translations.

4.1.3.2 Hire Purchase (Text 2)

The following table shows the amount of errors that occurred in the translations of Text 2 generated by System 1 and System 2. It can be said that the translation of Text 2 generated by System 2 includes more errors than the translation produced by System 1. In Text 2, Incorrect Word and Extra Word errors appear most frequently in two translations of Text 2 generated by two translation systems. In the following part, the text is analyzed based on the most frequent error types, which occur in the translation generated by each translation system.

<table>
<thead>
<tr>
<th>TYPE OF ERROR</th>
<th>TOTAL NUMBER</th>
<th>TOTAL PERCENTAGE</th>
<th>PERCENTAGE OF SYSTEM 1</th>
<th>PERCENTAGE OF SYSTEM 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>INCORRECT WORD</td>
<td>17</td>
<td>26%</td>
<td>12%</td>
<td>14%</td>
</tr>
<tr>
<td>EXTRA WORD</td>
<td>16</td>
<td>24%</td>
<td>10%</td>
<td>14%</td>
</tr>
<tr>
<td>MISSING WORD</td>
<td>14</td>
<td>21%</td>
<td>10%</td>
<td>11%</td>
</tr>
<tr>
<td>INCORRECT WORD FORM</td>
<td>7</td>
<td>10%</td>
<td>3%</td>
<td>7%</td>
</tr>
<tr>
<td>NOT-TRANSLATED WORD</td>
<td>8</td>
<td>12%</td>
<td>8%</td>
<td>4%</td>
</tr>
<tr>
<td>WORD ERROR</td>
<td>5</td>
<td>7%</td>
<td>5%</td>
<td>2%</td>
</tr>
<tr>
<td>SUM</td>
<td>67</td>
<td>100%</td>
<td>48%</td>
<td>52%</td>
</tr>
</tbody>
</table>

Table 5-Table 4-Number and Percentage of errors in the translation of Text 2
Incorrect Word error contain 25% of all errors within two translations. These errors show 12% in the case of System 1 and represent 14% in the case of System 2 where most sentences include this error. The errors may influence some parts of speech in the sentences. The following example is taken from translation generated by System 1.

Example (Text 2):
“Här kan du provbo medan du bestämmer dig (...)”

Translated (S1):
“Here you can Floorplanner-while you decide (...).”

Incorrect Word:
The verb ‘provbo’ should translated to ‘test live’ instead of ‘Floorplanner’.

Corrected form:
“Here you can test live while you decide (...).”

The next most common error is Extra Words that represent 23% of all errors in the two translated texts. They contain 10% of all errors in translation generated by System 1 and 15% in the case of System 2. The errors mostly concerned prepositions, verbs, and nouns. The following example is taken from the performance of System 2:

Example (Text 2):
“Annars fortsätter du att hyra, och kan när som helst under en optionsperiod bestämma (...).”

Translated (S2):
“Otherwise, you continue to rent, and may at any time during the option period to decide (...).”

Extra word:
The preposition of ‘to’ that is used after ‘period’ is extra since it is not in the main source.

Corrected form:
“Otherwise, you continue to rent, and may at any time during the option period, decide (...)”

Another most common error relating to Missing Words include 21% of all errors in the case of two translations. They show similar percentages of errors, 10%, in the case of the two systems outputs. The following example is taken from the translation generated by System 1.
Example (Text 2):
“Om du gör investeringar i bostaden kommer även de att komma dig till hands när det är du som står som ägare.”
Translated (S1):
“If you make the investments in dwellings, will also get you ready when it's you who is listed as the owner.”

Missing Words:
MW (D): The missing word is the pronoun ‘the investment’ that should be placed before ‘will also’. Since it is unclear antecedent, ‘the investments’ should be used before ‘will also’
Corrected form:
“If you make the investment in the dwelling, the investment will also get you ready when it's you who is listed as the owner.”

The next error relating to Not-translated Words contain 12% of errors in the case of both Systems. They contain 8%; in the case of System 1 which represent 2% in the case of System2.
The following example relating to Not-translated Word is taken from System 2:
Example (Text 2):
“Hyrköp är Stångåstadens bokoncept, (…)”
Translated (S2):
“Hire purchase is Stångåstaden’s bokoncept, (…) and terraced with hyrköpsmöjlighet.”

Not-translated word:
Not-translated words are ‘Stångåstaden’s bokoncept’ that should be translated to ‘Stångåstaden’s housing concept’
Corrected form:
“Hire purchase is Stångåstaden’ housing concept, (…)”

Incorrect Word Form errors include 10% of errors in the case of the two systems. They show 2% in the case of System 1 and 7% in the case of System 2.
Example (Text 2):
“Du börjar med att hyra, men har möjlighet att köpa huset från dag ett om du vill.”
Translated (S1):
“You begin to rent, but has the option to buy the House from day one if you want.”
Incorrect Word Form:
The verb ‘has’ is not in correct form in order to be agreed with its subjects. It should be ‘have’ to be the correct form. The other one is ‘the House’ that should be written in this form ‘the house’
Corrected form:
“You begin to rent, but have the option to buy the house from day one if you want.”

Finally, Word Order errors show 7% in the case of the two translations. They represent 5% in the case of System 1 and 2% in the case of System 2. The example relating to Word Order that is taken from System 1.
Example (Text 2):
“I Ekängen har vi par- och radhus med hyrköpsmöjlighet.”
Translated (S1):
“(…) in Ekängen and (…)”
Word Order:
The proper noun ‘In Ekängen’ is in the wrong place and should be transfered to the first of the sentence.
Corrected form:
“In Ekängen (…) and (…)”

In conclusion, Incorrect Words are the most common type of errors in translated Text 2 that surprisingly contain 45% of all errors in the case of System 1 and 65% of the whole errors in the case of System 2.
4.1.4 Conclusions

This fact should be noted that, regardless considering the type of the translation systems or the translated texts, out of six most common errors, just three groups, Incorrect Word, Extra Word, and Missing Word, have most effect on the translations. Whereas the four translations were translated acceptably, the translations of Text 2 included more errors than Text1 in the case of both systems. However, among the four translations, which approximately are the same based on their length, Bing System produced the worst translation in the case of Text 2 (about 60%). In comparison with Bing system, Google system produced fairly better translations, with less error, for both texts. Although there may be other features that affected the obtained results, they were ignored in this case.
4.2 Errors influencing cohesion

According to Halliday and Hasan, Cohesion chains are divided into Semantic relation (SR), Reference (Rf), Repetition (Rp) and Conjunction (C) (Halliday & Hasan, 1976). Cohesive chain, which are affected by different types of translation errors, is considered as a broken chain. The cohesion chains and the influence of errors on them are analyzed in the following parts. In first stage, it is preferred to find the cohesive chains. Then a relation between different types of errors and the cohesion chains should be found. Then, the broken chains, which are affected by the errors, are identified. Finally, the percentages of statistical data of the broken chains are calculated. As missioned before, the cohesive chains are analyzed through three kinds of statistical data that are accounted separately for each of the translations. The first step is identifying the major members of cohesions: Semantic relation (SR), Reference (Rf), Repetition (Rp) and Conjunction (C). Then, the percentages of the cohesion chains, which focused on the measure of cohesions in each type, are calculated. The next stage associates with identifying and calculating the percentages of the cohesions sub-groups. The first main group, Reference, contains the sub-groups, which in one way are divided into Personal, Demonstrative and Comparative reference. On the other hand, they are divided into Anaphoric and Cataphoric reference. Therefore, Reference is divided into two sections. One section includes personal, demonstrative, and comparative and the other section contains anaphoric and cataphoric. Semantic relation contains: Synonymy, Antonymy, Meronymy, and Holonym, etc. Although, Semantic relation contains more sub-groups than mentioned above, just four of them are analyzed in this work. Finally, the amount of main group and sub-groups of broken chains that are influenced by the errors are calculated. The following section takes a brief look at the total number of the cohesive chains in each translation. Moreover, the total number of the broken chains in the translated texts are also discussed. Analyzing the main groups and sub-groups of the cohesion chains for each text is presented in Appendix C.
Figure 2: Total numbers of cohesive chains for translations

Text 1

Google

Bing

Text 2

Google

Bing
4.2.1 Text 1: “Framtidens TV” (The Future TV)

Comparing the performance of the two different machine translation in the case of Text 1 shows that the number of distinguished cohesive chains are mostly similar in each main group. In other words, the number of the cohesive chains appear in the two systems outputs are approximately similar in translation of Text1. Analyzing Text 1 based on the cohesion chains is appeared in the following part.

<table>
<thead>
<tr>
<th>MAIN GROUPS</th>
<th>TEXT 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S 1</td>
</tr>
<tr>
<td>Reference</td>
<td>65%</td>
</tr>
<tr>
<td>Semantic relation</td>
<td>14%</td>
</tr>
<tr>
<td>Repetition</td>
<td>56%</td>
</tr>
<tr>
<td>Conjunction</td>
<td>21%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SUB-GROUPS</th>
<th>TEXT 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>Personal</td>
<td>93%</td>
</tr>
<tr>
<td>Demonstrative</td>
<td>3%</td>
</tr>
<tr>
<td>Comparative</td>
<td>3%</td>
</tr>
<tr>
<td>Anaphoric</td>
<td>21%</td>
</tr>
<tr>
<td>Cataphoric</td>
<td>10%</td>
</tr>
<tr>
<td>Antonym</td>
<td>16%</td>
</tr>
<tr>
<td>Synonym</td>
<td>5%</td>
</tr>
<tr>
<td>Holonym</td>
<td>16%</td>
</tr>
<tr>
<td>Meronym</td>
<td>16%</td>
</tr>
<tr>
<td>Additive</td>
<td>66%</td>
</tr>
<tr>
<td>Adversative</td>
<td>22%</td>
</tr>
<tr>
<td>Causal</td>
<td></td>
</tr>
<tr>
<td>Temporal</td>
<td>11%</td>
</tr>
</tbody>
</table>

Table 6-Percentage of main and sub-groups of Cohesions for Text1

Analyzing the systems outputs illustrate that the largest type of the cohesion chains relating to references with 65% in the case of System 1 and 64% in System 2. The next category belonging to Repetitions represent 56% in the case of System 1 and 54% in the case of System 2. Conjunctions show about 21% for System 1 and 19% for System 2. Finally, Semantic relations contain 14% in the case of System 1 and 16% in System 2. Based on previous assessments, reference chain is divided into the sub-groups. In this case, personal
**references** contain most amount, 93% for System 1, and 91% for System 2. Another sub-groups relating to **comparative references** contain 7% in the case of the two translations. **Demonstrative references** consist of 11% in the translation generated by System 1 and 10% in System 2 output. **References** relating to **anaphoric** category show 21% and 25% in the translations generated by System 1 and System 2 respectively. This amount for **cataphorics** are about 10% in the case of System 1 and 50% in the case of System 2. The sub-group relating to **Systematic relations** in this case include **synonymy** that show the least amount, 5%, in the two translations. The next type relates to the **meronymy** and **holonym**. These two sub-groups represent the same amounts that is 16% in the case of the two translations. The **antonym**, just the same as the two previous cases, illustrates the same amount, about 15% in the case of the two translations of the text. In the following part, an example of **meronymy** is shown. Since **meronymy** in the two translations are similar, just one of them is mentioned in following example. Here, **S** stands for sentence.

The following example is taken from System 1.

**Meronymy:**

“…practical commercial services (S2)…Stångåstaden's Accommodation Services in the future of TV (S2)”- that ‘practical commercial services’ can be a **meronymy** of the ‘Stångåstaden's Accommodation Services’ where the first lexical item is a part of the second one which is a more broad term.

Every text has sentences and clauses related to each other with a simple conjunction in order to be a complete and comprehensible text. Therefore, the sentences and clauses in the translated Text1 should be connected to each other to have a meaningful text. **Conjunction**, as the other member of cohesions chains, includes sub-groups: **additive**, **casual** and **temporal**. Among all sub-groups of conjunctions, **additive conjunctions** have the most frequency. The percentages of **additive conjunctions** are 66% for System 1 and 57% for System 2 that make the texts more comprehensible. The other types of conjunctions, **casuals** show 22% in the case of System 1 and 14% in the case of System 2. The statistical data for **temporal**, another sub-group of conjunctions, show a low percentage, 11% for System 1, and 14% in the case of System 2 for the two translations. Evaluating the cohesive chains in each translation illustrates that the discussed errors cause the cohesive chains to break. In the case of the translated Text1 produced by both translation systems, it can be observed that nearly more of the translated texts do not contain serious errors causing cohesion chains to break.
4.2.2 Text 2: “Hyrköp” (Hire Purchase)

Analyzing the translations of Text 2 show the number of the cohesion groups, which appear in the two translations of Text 2 generated by two systems, are approximately similar. Analyzing the translation based on the cohesion chains is appeared in the following part.

<table>
<thead>
<tr>
<th>MAIN GROUPS</th>
<th>TEXT 2</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
<td>S2</td>
<td></td>
</tr>
<tr>
<td>Reference</td>
<td>57%</td>
<td>58%</td>
<td></td>
</tr>
<tr>
<td>Semantic relation</td>
<td>11%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Repetition</td>
<td>18%</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>Conjunction</td>
<td>31%</td>
<td>31%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SUB-GROUPS</th>
<th>TEXT 2</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
<td>S2</td>
<td></td>
</tr>
<tr>
<td>Personal</td>
<td>84</td>
<td>88</td>
<td></td>
</tr>
<tr>
<td>Demonstrative</td>
<td>15</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Comparative</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Anaphoric</td>
<td>68</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>Cataphoric</td>
<td>15</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Antonym</td>
<td>57</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>Synonym</td>
<td>14</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>Holonym</td>
<td>14</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Meronym</td>
<td>14</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Additive</td>
<td>66</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td>Adversative</td>
<td>23</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Causal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporal</td>
<td>9</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

*Table 7-Percentage of main and sub-groups of Cohesions for Text 2*

Evaluating the translations generated by two systems illustrate that greatest amount of the cohesions relating to References with 57% for System 1 and 58% for System 2. The next group, Conjunctions, contain the same amount, 31%, in the case of both systems. Repetitions as the third group represent 18% by System 1 and show 16% by System 2. Finally, Semantic relations chains show 11% in the case of System 1 and 10% for System 2. Personal references, sub-groups of Reference chain, mostly consist 84% for System 1 and 88% for System 2. Demonstrative references show 15% in the case of System 1 and 11% in the case of System 2. Anaphorics show 68%, in the case of System 1 and 57% in the case of System 2. The next group, Cataphoric, represents only 15% and 17% in the case of System 1 and
System 2 respectively. There is no *comparative reference* cohesions in the case of two translations. Comparing the sub-groups of *Systematic relation*, reveals that *antonyms* include the greatest amount, 57% for System 1, and 34% for System 2. The next category concerning with *synonyms* show 15% in translated Text 2 generated by System 1 and 33% in the case of System 2. *Meronymy* and *Holonymy* illustrate 14%, and 16%, in the case of System 1 and System 2 respectively. In contrast with the *holonymy*, where a whole describes a part, the *meronymy* is considered as a part representing a whole. In the translation, it is important to notice that these two sub-groups can be applied interchangeably. In the following part, there are some examples for *meronymy* and *holonymy*. In the examples, S stands for the abbreviation of sentence and the number in front of it represents the sentence number in the translation.

The first example is related to the translation generated by System 1.

**Holonymy:**

“*Smart TV (S2)*...*Future TV (S1)* and *digital TV (S3)*”– Here the word *Smart TV* is more general and include Future TV and *digital TV*.

The next example is taken from the translated text generated by System 2:

**Meronymy:**

“*Couples (S13)*...*families (S13)*”– As the first word can be considered as a part of the second one, a meronymy exists.

As mentioned before, in order to have a comprehensible translation, all sentences and clauses in a text should be related to each other with conjunction, like *and* in order to have a comprehensible text (Halliday & Hasan, 1976). This text is no exception. The text’s sentences and clauses should be connected to each other by Conjunctions. *Casual, Temporal,* and *Additive conjunctions* assigned a small percentage in both translations. *Casuals* contain 23% of *conjunctions* in System 1 and 21% in System 2. The second type, *Temporal Conjunctions*, illustrate 9% of *conjunctions* in the translation generated by System1 and 5% in the case of System2. Comparing with *Additive*, the two previous sub-groups of *conjunction* represent small percentages in the two translations. *Additive Conjunctions* allocate 66% of *Conjunctions* in System 1 and 73% in the case of System 2. Among the cohesive groups, *repetitions* and *references* are most affected by the errors. All of these affected categories are explained by some examples in the following parts. Analyzing the cohesion groups clarify...
how different types of errors cause Referential chain, Repetition and Semantics relations to break.
The first example is taken from System 2 and shows that the referential chain is broken due to a Missing word error.

**Broken Referential chain:**
“Otherwise, (Missing word ‘you’)….continue to… (S8)” where missing preposition “you” caused each referential chain to broke.

The next two examples are taken from the translations generated by System 2 where repetition and semantic relation chains are broken due to Missing word and Not-Translated errors.

**Broken Repetition chain:**
“….with (Not-translated compound word) hyrköpsmöjlighet (S1). (Missing word & NT words ‘hyrköpsmöjlighet’) A concept (S2) ….” In this case, Missing word and Not-Translated errors caused referential chains to break.

**The semantic relation:**
“Rent first and then, (Missing word ‘buy’) if you…” (S3). Here, Missing word caused the semantic relation, antonym, to broken.

### 4.2.3 Conclusions

In summary, it can be concluded that the evaluations are useful to recognize common patterns relating to the cohesion chains, which are preserved in the systems outputs. According to previously obtained statistical data, it is clear that the most frequent cohesions belong to Reference chains with highest percentages in two out of two translations generated by System2. Conjunction and Repetition are the next largest groups of the cohesion chains in that system. In the case of System 1, Reference chains include the most frequent cohesions chains in two out of two translations. Moreover, in the case of broken cohesive chains, reference chains have the most broken chains in the translations generated by both translation Systems. Finally, the least affected chains are concerned with repetition in the case of the four translations. In spite of small percentages of the broken chains, they have important effects on the comprehension of the translated texts. The comprehension tests reveal statistically the extent to which the human subjects comprehend the systems outputs.
4.3 Comprehension Test

As mentioned before, comprehension tests are prepared to analyze the comprehensibility of the translations. The tests include four questions for each translation that are asked from the subjects who are non-native speakers of English who do not understand Swedish. The obtained results show that Text 1, “The future TV”, is considered as the best translation based on the amount of errors and comprehensibility. Generally, Google translate performs better than Bing translation system in the case of the Text 1. The translations that are produced by Bing are not as good as Google translate, but they are acceptable.

The following tables illustrate which questions are most problematic for the subjects. The information in these tables and the analysis of the questions related to parts of each translation, show which translation is more understandable. The following section analyzes the relationship between the questions with low percentages of correct answers, and the common errors. The questions with less than 80% of correct answers are considered as problematical ones. Finally, the errors that appear in parts of the translation, which the questions are related to, are analyzed.
4.3.1 Comprehension test- Text1

The following table illustrates which questions are most problematic for the subjects. The questions with less than 80% of correct answers are considered as problematic ones and they are analyzed in the following part. Each question followed by its correct answer, which is taken from the appropriate part of the translated text. Then, the errors that appear in the part of the translation, which the question is related to, are analyzed. Finally, the correct form of the sentence is offered.

<table>
<thead>
<tr>
<th>% OF CORRECT ANSWERS FOR PER QUESTION (10 SUBJECT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S2</td>
</tr>
<tr>
<td>Future TV</td>
</tr>
<tr>
<td>Future TV</td>
</tr>
</tbody>
</table>

Table 8- Test results Text 1—percentage of correct answers per question (5 subjects)

4.3.1.1 The translation performance by S1

According to the above table, some questions, which are more problematic, are contained less than 80% correct answers. Examining these questions is shown in the following parts.

Question 3 (60% of students answered correctly): What is the goal of Stångåstaden by providing future TV?

Expected answer:

“Reduce the amount of printed information by future TV.”

Exact answer in translated text by S1:

“Stångåstaden long-term goal is to reduce the amount of printed information in such stairwells with information by Future TV.”

Errors affecting the comprehension of the translated text:

IWF: Incorrect word form is incorrect Genitive Noun Phrase that should be mentioned in ‘Stångåstaden’s long-term goal’ instead of ‘Stångåstaden’.

IW: Incorrect word is ‘such’ should be translated to ‘for example’ phrase instead.
WO: ‘in’ should be placed after ‘such as’
Corrected form:
Stångåstaden’s long-term goal is to reduce the proportion of printed information for example in stairwells with information by Future TV.

In this case, whereas no serious errors were found in the translation, it is very difficult to find a reason for high number of incorrect answers, attained in this experiment. It can be concluded that the subjects had not fully understood the concept of the question.

4.3.1.2 The translation performance by System 2
Above table shows, some questions contain less than 80% of correct answers. These questions are analyzed in the following.

Question 4 (Answered correctly just by 30% of the Human subjects): What do you do if you need help with the installation of future TV?

Expected answer:
“We contact Com Hem customer service at the special number 0775-17”

Translation provider by System 2:
“Please contact customer service at the Aminu Com for Future TV special phone number 0775-17 17:17 so they can help you.”

Errors affecting the comprehension of the translated text:
IW: Incorrect noun is ‘Aminu Com’ that should be ‘Com Hom’.
WO: Incorrect words order are ‘Com Hem’ that should be followed ‘contact’ and ‘for Future TV’ that should be placed after ‘service’
Corrected form:
“Please contact Com Hem customer service for Future TV at the special phone number 0775-17 17:17 so they can help you.”

In conclusion, it can be said that the errors influence the understanding of the translation and it may be the cause for the low percentages of corrected answers.
Question 1 (Just 40% of the human subjects answered correctly): What is the benefit of Future TV in comparison to digital TV?

Expected Answer:
“Future TV provides a wide variety of entertainment and many practical commercial services.”

Translation provided by S2:
“In addition to digital tv gives you a wide variety of entertainment and many practical commercial services via Stångåstaden's Accommodation Services in the future of TV.”

Error affecting the comprehension of the translated text:
IW: The verbs ‘gives’ should be changed to ‘get’. It is obvious that ‘gives’ is not in correct form. In this case, two types of errors are merged in one type.
WO: The pronoun ‘you’ should come before ‘get’

Corrected form:
“In addition to digital TV, you get a wide variety of entertainment and many practical commercial services via Stångåstaden's Accommodation Services in the future of TV.”

Therefore, in this case, the errors affected the understanding of the translation and it is the reason for relatively high percentages of incorrect answers by human subjects.

Question 2 (Answered correctly by 50% of the students): How do you see that there is a new message waiting for you?

Expected answer:
“We can see the new message through an icon in zapbaren that comes up by changing the TV channel.”

Translation provider by System 2:
“Through an icon in the zapbaren, the Strip that comes up when changing the tv channel, you can see that a new message is waiting.”

Errors affecting the comprehension of the translation:
NT: The Not-translated word is ‘Zapbaren’ considered as a name that has not translated.
This example clearly illustrates that the error has an important effect on the translation and may be the main cause for low percentage of correct answers to this question.

Corrected form:
“Through an icon in the Strip that comes up when changing the tv channel, you can see that a new message is waiting.”
4.3.2 Summary for Text 1

The obtained results from the comprehension test of Text1 and the percentages of the incorrect answers show that System1 generated the best translation. System2, Compared with System1, produced the worst translation, which has been influenced mostly by Incorrect words, and slightly by Not-translated words, Word order errors and Missing words.
4.3.3 Comprehension test-Text 2

The following table obviously shows which questions are most problematic for the subjects. The questions with less than 80% of correct answers are considered as problematic ones and they are analyzed in the following part. Each question followed by its correct answer, which is taken from the appropriate part of the translated text. Then, the errors that appear in the part of the translation, which the question are related to, are analyzed. Finally, the correct form of the sentence is offered.

<table>
<thead>
<tr>
<th>% OF CORRECT ANSWERS FOR PER QUESTION (10 SUBJECT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texts</td>
</tr>
<tr>
<td>Hire Purchase</td>
</tr>
<tr>
<td>S1 Hire Purchase</td>
</tr>
<tr>
<td>S2 Rental Purchase</td>
</tr>
<tr>
<td>Q1 100</td>
</tr>
<tr>
<td>Q2 60</td>
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<tr>
<td>Q3 40</td>
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<tr>
<td>Q4 100</td>
</tr>
<tr>
<td>MEAN 65</td>
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<td>Q1 80</td>
</tr>
<tr>
<td>Q2 70</td>
</tr>
<tr>
<td>Q3 50</td>
</tr>
<tr>
<td>Q4 90</td>
</tr>
<tr>
<td>MEAN 54</td>
</tr>
</tbody>
</table>

Table 9- Test results Text 2- Percentage of correct answers per question (5 subjects)

4.3.3.1 The translation performance by System 1

Table 2 represents some questions relating to Text 2 that are answered by less than 80% of the subjects. The following parts show examples of some parts of the translation of Text 2 by System 1, which are the most problematic for the subjects.

*Question 3 (unfortunately, just 40% of the subjects answered correctly): According to the passage, do you think that Hire purchase can be suitable for students?*

*Expected answer:*

“No, it is not”

*Translated Text2 provided by S1:*

“Households with uncertain economic utvecklig. You may be experiencing illness, received layoff notices or thinking about studying.”

*Errors affected comprehension of translated text:*

NT (N): The ‘utvecklig’ should translate to ‘growth’

IW: The verb ‘be experiencing’ is better to change to ‘be suffering from’
IW (Pr): The pronoun ‘You’ should be changed to ‘They’
IW: ‘thinking’ is not grammatically correct and should be changed to ‘are thinking’ Not ‘thinking’. Verb ‘received’ should be changed to ‘have received’
Corrected form:
Households with uncertain economic situation. They may be suffering from illness, have received layoff notices or are thinking about studying.

No doubt, the errors have important effects on the comprehensibility of the translated sentences that may be the reason for the low percentages of correct answers.

*Question 2 (answered correctly by 60% of students): What services does Hire purchase offer?*

**Expected answer**
“The concept offers a tenant the choice of the living area with regard to family relationships or financial status.”

**Translated Text2 provided by S1**
“Concept allows you as a tenant choice and scope for changes in family relationships or finances. Lease purchase also allows you to get to know your area and try a new type of housing before buying.”

**Error affect comprehension of translated text**
MW: In this case, article ‘the’ is missed and should be placed before ‘concept’ to have a correct sentence.
IW: The word ‘choice’ should be changed to ‘freedom of choice’
IWF: The word ‘housing’ should be changed to ‘house’
IWF: The word ‘Lease purchase’ is better to be changed to ‘Hire purchase’
Corrected form
“The Concept allows you as a tenant freedom of choice and scope for changes in family relationships or finances. Hire purchase also allows you to get to know your area and try a new type of house before buying.”

In this case, the error does not have an important effect on the comprehensibility of the translation but a few students have problems that may due to a misunderstanding of the concept of the question.
4.3.1.2 The translation performance by System 2

The table reveals which questions in the translation of Text 2 generated by System 2 are most problematic and cause the subjects to be confused.

Question 2 (70% of the students answered correctly): What services does Lease purchase offer?

Expected answer:
“Lease purchase offer a tenant the choice of living area in regard to family relationships or financial status.”

Translated Text2 provided by S2:
“The concept gives you as a tenant choice and scope for changes in family circumstances or economics. Leasing also allows you to get to know your area and try on a new accommodation form before you buy.”

Error affect comprehension of translated text
IW: the word ‘try on’ should be changed to ‘try’
IW: the ‘choice’ should be changed with ‘the freedom of choice’

Corrected form
“The concept gives you as a tenant the freedom of choice and scope for changes in family circumstances or economics. Leasing also allows you to get to know your area and try a new accommodation form before you buy.”

The errors that occurred in this part caused the meanings of the sentences to be changed. Therefore, the subjects had problems and gave the wrong answers to the question.

Question 3 (50% of subjects answer correctly): According to the passage, do you think that Hire purchase can be suitable for students?

Expected answer:
“No, it is not”

Translation generated by S2:
Households with uncertain economic development. You may have been affected by the disease, received the termination notice or are looking to study.

Errors affect comprehension of translated text
IW: The pronoun ‘You’ that should be changed to ‘They’
IW: The verb ‘have been affected’ should be replaced with ‘suffer from’
IW: The verb ‘are looking to’ is not correct and should be changed to ‘are thinking about’
IWF: ‘study’ is a verb and is used after a preposition so it should be written in this form ‘studying’ NOT ‘study’

Corrected form
Households with uncertain economic development. They may be suffering from a disease, have received a termination notice or are thinking about studying.

Some types of errors have affected the translation in this part. The effects of errors can be the reason for the remarkably low percentages of correct answers. The other reason may be a misunderstanding of the question concepts. These reasons may cause the subjects to answer the question incorrectly.

4.3.4 Summary for Text 2

Analyzing the problematic questions regarding to the comprehension test of Text 2, clearly illustrates that the translation of Text 2 is mostly affected by errors. Since some major errors were found in some cases, the percentages of the incorrect answers were high. Moreover, The high percentages of incorrect answers may due to a misunderstanding of the question.
4.3.5 The analysis of the comprehension tests

The comprehension tests were conducted in order to find a correlation between the various types of errors which emerge in the parts of the translations in question, and the incorrect answers. The statistical data illustrate that some types of errors, Incorrect words, Missing words and Not-translated words, have more effects on the comprehensibility of the translated texts. The statistical data clarify the best translation relating to Text1 was generated by System1. System 2 had worse performance for the translation of the same text that 50% of the subjects answered the related questions correctly. Therefore, System 1 performed better than System 2 in the case of Text1. Therefore, System 2 includes the most number of errors, about (33) errors, in the translation of Text1. Among those errors, Incorrect words include (11) errors, nearly 1/3rd of all of errors. The next largest type of errors belong to Extra words include (8) errors, i.e. they contain 30% of all errors in the translation of Text1. In compare with System2, System1 includes more errors, (34) errors, in the translation of Text2. In this case, Incorrect word with (9) and then Missing word with (7) errors have most amounts of errors, respectively. Generally, Incorrect words are the largest group of errors in the four translations that influenced the general understanding of the translations.

Undoubtedly, there are other significant factors, which may affect the obtained results of the comprehension tests. The human subjects’ level of English knowledge, level of educational background, and personal characteristics of the subjects are some of these. The reason for such an assertion is that the subjects with a good level of English knowledge can cope with many types of errors that occur in the translations. Therefore they can understand the translations easily and answer the questions correctly.
5 Conclusion and future work

In this work, a human Machine Translation Evaluation has been conducted to investigate whether the comprehensibility and the cohesion are preserved in Swedish-English machine translated texts. In other words, the aim of this study was to recognize and analyze the different types of errors, which appear in various types of the translations. Moreover, the types of errors that had more influences on the comprehensibility of the translated texts was also investigated.

Through the analyzing, a common categorization of errors was offered. The errors were divided into the main groups and sub-groups. The main groups were Incorrect word, Not-translated word, Missing word, Word order, Incorrect word form, and Extra word. Among the main groups of errors, three errors, Incorrect word, Extra word and Missing word, had more effects on the comprehensibility of the translated texts. The statistical data illustrated that Incorrect word contained 32%, Extra word included 23%, and Missing word contained 15% of the errors, which were most frequency of errors in the four translations. Not-translated Words containing a minor percentage of the errors, 9%, had a significant influence on the comprehensibility of the systems outputs. Moreover, Word Order contained the least amount of the errors, 6%, had noticeable effect on the comprehensibility of the translations. Conversely, Incorrect Word Form containing 13% of all errors did not have a considerable effect on the comprehensibility of the translated texts. Having considered the frequency of the errors, it is reasonable to focus on the type and seriousness of errors. In general, the effect of errors on prepositions, articles, and genitives are least serious and the meaning of the translations are preserved. The influence of errors on nouns, verbs, adjectives, and adverbs are significant so that the meaning of the sentences are usually changed. It can be concluded that, the comprehensibility of the translations depends on what part of speech is influenced by the errors. It is important to note however, that one type of error may change the meaning of some parts of a translation, while the groups of errors do not change the meaning of the translation. The obtained results of the comprehension tests proved this assertion.

There is also, however, a further point to be considered. Some errors not only influence the comprehensibility of the translation, but they also affect the cohesion chains. According to the evaluation of the cohesion chains, the greatest amount of the cohesions groups belonging to References contained 61% of cohesions. The next two groups concerned with Semantic
relations and Conjunctions, which included 18% and 17% of the cohesions respectively. Repetition chains included the fewest frequencies, about 11% of all cohesion chains. Analyzing the cohesion chains illustrated that the main groups of errors also affected the cohesive chains and caused the cohesions to be broken. The obtained results from the analysis of the cohesion chains showed that Incorrect words, Missing words, and Not-translated words had most effects on the cohesion chains and caused them to be broken.

From analyzing the cohesion chains, it can be concluded that the broken cohesive chains also affect the comprehensibility of the translated texts. The influence of the broken chains on the comprehensibility of the translations are intimately related to the effect of the common errors on the translations. This means that having numerous types of errors in the translation lead to having plenty of the broken cohesive chains. Since errors like Missing words and Not-translated words influenced the cohesions chains, it can be concluded that the errors, especially the main groups of errors, cause a cohesive chain to be broken.

It was also investigated to what extent the errors and the broken cohesive chains influence the comprehensibility of the systems’ outputs. To achieve this aim, some comprehension tests were prepared. The tests included four questions for each translation that should be answered by the subjects. It was assumed that there might be a relationship between the incorrect answers and problems with the cohesive chains and the errors in the translations. From the obtained results can be concluded that there is no direct correlation between the percentages of the correct answers and the amount of the errors in the parts of the translations in the question. According to Table3, the percentage of statistical correlation of the correct answers is weak, around 64%, in the case of four translations. The statistical correlation analysis obviously demonstrates that the subjects’ comprehension of the translations very closely depends on the seriousness and the types of the errors instead of the amount of errors. Moreover, the results would affirm the first assertion about errors analysis. From all above it would be possible to clarify why the questions with more than 80% of correct answers, contained 6 to 8 errors in a short part of the text. On the other hand, the question relating to the parts of the translations that no errors, were answered correctly by only 30% of the subjects. The reason for all of them is that there is no relationship between incorrect answers and the number of errors. The results clearly demonstrate that the previously mentioned
theory about the relation between the translations quality and number of errors was not correct.

It is now clear that different MT systems produced a translation in a various ways, which can be useful regardless of errors in translated texts. Therefore the answer to the question “which the translation systems for Swedish-English translation has the best performance?” is probably that the two translation systems generate nearly the same quality of the translations. However, Google translate with a low average of errors, which had no significant effects on the comprehensibility of the translations, can be considered as the best system.

Further research needs to be done to establish a greater degree of accuracy in this study. This project was limited in several ways. The main weakness of this work was that the number of translations and subjects were relatively small. If it would be possible to have an enormous amount of data, it would lead to a more precise result. Having a large amount of data, would allow us to investigate the most common mistakes that occur in a formal or informal translated text in order to attain an accurate result. Subsequently, having more translated texts would be more helpful to make an accurate analysis about which types of errors have more influence on what part of speech in a translation. Moreover, the researchers will be able to evaluate the relationship between the errors and the comprehensibility of a translated text to achieve a more accurate result. This investigation calls to mind the question of “how the students come up with the blanks created by the errors?” The answer to this question, would perhaps describe the reason why the under questions parts of the translations, which contain many errors were mostly answered correctly while the answers to the questions belonging to the parts with a few or no errors, were not. The other problem in conducting a research, the same as this work, is that analyzing problems of human Machine translation systems is very time consuming procedure. However, in order to attain an accurate result from evaluating the comprehensibility and the cohesion in a translation, there is no other choice. Taken together, this work has revealed many questions in need of further investigation.
6 References


https://www.stangastaden.se/sokledigt/hyrkop/Pages/Hyrk%C3%B6p.aspx
https://www.stangastaden.se/BOENDEINFO/HYRESGASTINFO/FRAMTIDENSTV/Pages/default.aspx
## Appendixes A- Complementary Tables

<table>
<thead>
<tr>
<th>Question</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
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<th>R²</th>
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<tr>
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<td></td>
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</table>

*Table 10*-Correlation between percentage of correct answers per question and number of errors per question
Appendix B- Analysis of errors in the translations

Text 1: “Framtidens TV”

Framtidens TV

En lättare vardag med Framtidens TV

Våra hyresgäster var först i Sverige med att få tillgång till smarta tv-tjänster som gör livet bekvämare utan att det kostar något extra. Förutom digital-tv får du ett brett nöjesutbud och många praktiska nyttotjänster via Stångåstadens Boendetjänster i Framtidens TV.

Om Framtidens TV


Mycket nöje!

Vad tycker du är det bästa med Framtidens TV?

Visste du att...

...du får meddelanden om vad som händer kring ditt boende i Framtiden TV?

Meddelande i Framtidens TV


Tjänsten används för att få ut sådan information som direkt berör dig som hyresgäst, till exempel att vattnet tillfälligt kommer att stängas av eller att innergården ska rustas upp osv.

Håll utkik!

Energikonto i Framtidens TV

I Framtidens TV – under knappen Min lägenhet – kan du nu se statistik över din förbrukning av hushållsel.

En förutsättning, för att var och en ska kunna bidra till att minska sin elförbrukning, är att kunna se hur mycket el man använder. Trots att Stångåstadens för det mesta inte är ägare av
abonnement av hushållslen*, ser vi det ändå som en del av vårt ansvar för miljö- och energifrågorna att jobba för en ökad energieffektivisering.

Uppgifterna om elförbrukningen lämnas av Tekniska Verken och det är bara du som kan se dina egna värden.

* i ett fåtal lägenheter ingår hushållsel i hyran
A. Translation by Google translate System (S1)

*Future TV*

*A minor living with Future TV*

Our tenants were the first in Sweden to access Smart TV services that make life more comfortable without it costing anything extra. Besides digital television, you get a wide range of entertainment and many practical utility services through Stångåstaden Accommodation Services in Future TV.

*About Future TV*

Stångåstaden long-term goal is to reduce the proportion of printed information in such stairwells with information by Future TV. It is important that you have connected your equipment. Having problems with wiring? Get in touch with Com Hem's customer service at it for future television special phone number 0775-17 17:17 so they can help you. Either by phone or through home visits.

*Enjoy!*

**What do you think is the best part of the Future TV?** - [vote here!](#)

**Did you know that...**

... You get messages about what's happening around your accommodation in Future TV?

*Messages in Future TV*

Future TV was developed with a service for targeted information, specifically adapted to every household. Through a symbol in zapbaren, the strip that comes up when changing the TV channel, you can see that a new message is waiting. Using the remote control is clicked the message forward for reading.

The service is used to get information that directly affects you as a tenant, such that the water will be temporarily shut down or to the courtyard will be refurbished and so on.

*Look out!*

*Energy Account in Future TV*

in Future TV - the key My apartment - you can now view statistics on your consumption of household electricity.

A prerequisite, for each one should be able to help reduce their electricity consumption, is to see how much electricity you use. Although Stångåstaden for the most part are not the owner
of the subscription of household electricity *, we see it anyway as part of our responsibility to the environment and energy issues to work for increased energy efficiency. The data on electricity consumption supplied by Technical Office and it is only you who can see your own values.

*in a few apartments include electricity in the rent.
a) Errors in the translation Text 1 generated by System 1

1. Swedish input sentence
En lättare vardag med Framtidens TV

English output:
A minor living with Future TV

Errors:
IW (N): Incorrect word is ‘A minor’ that should be changed to ‘An easier’ referring to quality of life that is changed by using Future TV.

IW (G): The Swedish word ‘vardag’ is a noun but it has been translated to ‘living’ that is an adjective. Therefore, it should be changed to ‘daily life’

Corrected form:
An easier daily life with Future TV.

2. Swedish input sentence
Stångåstads målsättning på sikt är att kunna minska andelen tryckt information i exempelvis trapphusen med information genom Framtidens TV.

English output:
Stångåstaden long-term goal is to reduce the proportion of printed information in such stairwells with information by Future TV.

Errors:
IW (GNP): Incorrect word form is incorrect Genitive Noun Phrase that should be mentioned in ‘Stångåstaden’s long-term goal’ instead of ‘Stångåstaden long-term goal’.

IW (A): Incorrect word is ‘such’ should be translated to ‘such as’.

WO: the preposition ‘in’ should be placed after ‘such as’

Corrected form:
Stångåstaden’s long-term goal is to reduce the proportion of printed information such as in stairwells with information by Future TV.

4. Swedish input sentence
Ta kontakt med Com Hems kundservice på det för Framtidens TV speciella telefonnumret 0775-17 17 17 så kan de hjälpa dig.

English output:
Get in touch with Com Hem's customer service at it for future television special phone number 0775-17 17:17 so they can help you.
Errors:
IW (Pro): Incorrect word is the pronoun ‘it’ that should be changed to article ‘the’.
WO: Incorrect Word order is the phrase of ‘for future television’ that should be preceded ‘service’
Corrected form:
Get in touch with Com Hem’s customer service for Future TV at the special phone number 0775-17 17:17 so they can help you.

5. Swedish input sentence
Genom en symbol i zapbaren, den remsa som kommer upp vid byte av tv-kanal, går det att se att ett nytt meddelande väntar. Med hjälp av fjärrkontrollen klickas meddelandet fram för läsning.

English output:
Through a symbol in zapbaren, the strip that comes up when changing the TV channel, you can see that a new message is waiting. Using the remote control is clicked the message forward for reading.

Errors:
NT (Pn): in this case ‘Zapbaren’ has not been translated.
WO: ‘the message’ should be written down after ‘the remote control’
Corrected form:
Through a symbol in zapbaren, the strip that comes up when changing the TV channel, you can see that a new message is waiting. Using the remote control, the message is clicked forward for reading.

6. Swedish input sentence
(...) till exempel att vattnet tillfälligt kommer att stängas av eller att innergården ska rustas upp osv.

English output:
(...), such that the water will be temporarily shut down or to the courtyard will be refurbished and so on.

Error:
IW (Pr): Incorrect word is preposition ‘to’ and should be changed to ‘that’
IW: ‘till exempel’ should be translated to ‘for example’ NOT ‘such that’
Corrected form:

(…), for example the water will be temporarily shut down or the courtyard will be refurbished and so on.

7. Swedish input sentence

I Framtidens TV – under knappen Min lägenhet – kan du nu se statistik över din förbrukning av hushållsel.

English output:
in Future TV - the key My apartment - you can now view statistics on your consumption of household electricity.

Errors:

MW (Pr): the preposition ‘under’ should be placed before ‘the Key’
IWF: ‘in’ should be written in the capital form ‘In’

Corrected form:

In Future TV - under the key My apartment - you can now view statistics on your consumption of household electricity.

9. Swedish input sentence

Trots att Stångåstaden för det mesta inte är ägare av abonnemanget av hushållselen*, ser vi det ändå som en del av vårt ansvar för miljö- och energifrågorna att jobba för en ökad energieffektivisering.

English output:

Although Stångåstaden for the most part are not the owner of the subscription of household electricity *, we see it anyway as part of our responsibility to the environment and energy issues to work for increased energy efficiency.

Error:

IWF (V): Incorrect word form is the Swedish verb ‘är’ that should be translated to ‘is’ Not ‘are’

Corrected form:

Although Stångåstaden for the most part is not the owner of the subscription of household electricity *, we see it anyway as part of our responsibility to the environment and energy issues to work for increased energy efficiency.

8. Swedish input sentence

Uppgifterna om elförbrukningen lämnas av Tekniska Verken och det är bara du som kan se dina egna värden.
The data on electricity consumption supplied by Technical Office and it is only you who can see your own values.

**Error:**

**IWF (V):** Incorrect word form is the Swedish verb ‘lämnas’ that should be translated to ‘is supplied’ instead of ‘supplied’

**Corrected form:**
The data on electricity consumption is supplied by Technical Office and it is only you who can see your own values.
B. Translation by Bing translate System (System2)

*The Future of TV*

**An easier daily life with the future of TV**

Our tenants was first in Sweden with access to smart tv services that make life more comfortable without it costing anything extra. In addition to digital tv gives you a wide variety of entertainment and many practical commercial services via Stångåstaden's Accommodation Services in the future of TV.

To start the future of television!

**About The Future Of TV**

Stångåstaden's objective is to reduce the proportion of printed information in the corridors, for example, with information by the future of TV. It is important that you have plugged in your equipment.

Do you have a problem with the connection? Please contact customer service at the Aminu Com for Future TV special phone number 0775-17 17 17 so they can help you. Either by telephone or through home visits.

Enjoy!

**What do you think is the best thing about the future of TV?**

**Did you know that…**

... you will receive messages about what is happening around your accommodation in Future TV?

**Messages in the future of TV**

The future of TV has been developed with a service for targeted information, specifically for each household. Through an icon in the zapbaren, the Strip that comes up when changing the tv channel, you can see that a new message is waiting. With the help of the remote control is clicked the message for reading.

The service is used to get information that directly concern you as a tenant, for example, that the water will be turned off temporarily or to the courtyard to be re-equipped, etc.

Keep an eye out!

**Energy account in future of TV**

The future of TV – under the button my apartment – you can now see statistics on your consumption of household electricity.
A prerequisite, to each one to help to reduce their electricity consumption, is to be able to see how much electricity you use. Despite the fact that the Stångåstaden for the most part, not the owner of the subscription of the domestic electricity *, we see it anyway as part of our responsibility for environmental and energy issues to work for increased energy efficiency. The data on electricity consumption supplied by Tekniska Verken and only you can see your own values.*

In a few apartments include household electricity in the rent
b) Errors in the translation Text 1 generated by System 2

1. Swedish input sentence
Framtidens TV

English output:
The Future of TV

Error:
EW (Pr): Extra word is the preposition ‘of’ and ‘The’

Corrected form:
Future TV

2. Swedish input sentence
En lättare vardag med Framtidens TV

English output:
An easier daily life with the future of TV

Error:
EW (Pr): Extra word is the preposition ‘of’ and another is ‘The’

Corrected form:
An easier daily life with future TV

3. Swedish input sentence
Våra hyresgäster var först i Sverige med (...).

English output:
Our tenants was first in Sweden with (…).

Error:
IWF (V): Incorrect word is the verb ‘was’ that is not agree with its plural subject so it should translate to ‘were’ NOT ‘was’

MW (Art): Missing word here is the article ‘the’

Corrected form:
Our tenants were the first in Sweden with (…).

4. Swedish input sentence
Förutom digital-tv får du ett brett nöjesutbud och många praktiska nyttotjänster via Stångåstadens Boendetjänster i Framtidens TV.
In addition to digital TV, you get a wide variety of entertainment and many practical commercial services via Stångåstaden's Accommodation Services in the future of TV.

Errors:
IW (V): Incorrect word is the verb 'gives' that should be changed to 'get'
WO: The verb 'get' should be used after the pronoun 'you'

Corrected form:
In addition to digital TV, you get a wide variety of entertainment and many practical commercial services via Stångåstaden's Accommodation Services in Future TV.

5. Swedish input sentence
Så här startar du Framtidens TV!

English output:
To start the future of television!

Error:
IWF (V): 'the future of television’ is better to change to ‘Future TV'

Corrected form:
To start Future TV!

6. Swedish input sentence
Stångåstadens målsättning på sikt är att kunna minska andelen tryckt information i exempelvis trapphusen med information genom Framtidens TV.

English output:
Stångåstaden's objective is to reduce the proportion of printed information in the corridors, for example, with information by the future of TV.

Errors:
EW (Pr): The preposition ‘of’ is extra

Corrected form:
Stångåstaden's objective is to reduce the proportion of printed information in the corridors, for example, with information by the future TV.

7. Swedish input sentence
Ta kontakt med Com Hems kundservice på det för Framtidens TV speciella telefonumret 0775-17 17 17 så kan de hjälpa dig.
English output:
Please contact customer service at the Aminu Com for Future TV special phone number 0775-17 17 17 so they can help you.

Errors:
IW (N): ‘Aminu Com’ should be changed to ‘Com Hem’
NT (Pn): ‘Com Hem’ as a proper noun has not been translated
WO: Incorrect words order are ‘Com Hem’ that should be placed before ‘contact’ and ‘for Future TV’ that should be written after ‘service’
MW: The preposition ‘med’ has been missed and should be translated to ‘with’

Corrected form:
Please contact with Com Hem customer service for Future TV at the special phone number 0775-17 17:17 so they can help you.

9. Swedish input sentence
Genom en symbol i zapbaren, den remsa som kommer upp vid byte av tv-kanal, går det att se att ett nytt meddelande väntar.

English output:
Through an icon in the zapbaren, the Strip that comes up when changing the tv channel, you can see that a new message is waiting.

Error:
NT (Pn): In this case, ‘Zapbaren’ as the proper name has not been translated.

Corrected form:
Through a symbol in zapbaren, the strip that comes up when changing the TV channel, you can see that a new message is waiting.

10. Swedish input sentence
Med hjälp av fjärrkontrollen klickas meddelandet fram för läsning.

English output:
With the help of the remote control is clicked the message for reading.

Error:
WO: the noun ‘the message’ is in the wrong place and should be followed the phrase ‘the remote control’

Corrected form:
Using the remote control the message is clicked forward for reading.
11. Swedish input sentence
(...), till exempel att vattnet tillfälligt kommer att stängas av eller att innergården ska rustas upp osv.

English output:
(…), for example, that the water will be turned off temporarily or to the courtyard to be re-equipped, etc.

Error:
IW (Pr): Incorrect word is preposition ‘to’ that should be written ‘that’.

Corrected form:
(…), for example, that the water will be turned off temporarily or that the courtyard to be re-equipped, etc.

12. Swedish input sentence
Energikonto i Framtidens TV

English output:
Energy account in Future of TV

Errors:
EW (Pr): The preposition ‘of’ is extra

Corrected form:
Energy account in Future TV

13. Swedish input sentence
I Framtidens TV – under knappen Min lägenhet – kan du nu se statistik över din förbrukning av hushållsel.

English output:
The future of TV – under the button my apartment – you can now see statistics on your consumption of household electricity.

Errors:
EW (Pr): The preposition ‘of’ is extra
MW (Pr): The preposition ‘In’ should be written down before ‘Future TV’
IWF (Prn): The pronoun ‘Min’ which has been translated to ‘my’ should be written down with capital ‘M’ in translation to indicate that “My apartment” is a label.

Corrected form:
In Future TV - under the button My apartment - you can now view statistics on your consumption of household electricity.
13. **Swedish input sentence**
En förutsättning, för att var och en ska kunna bidra till att minska sin elförbrukning, är att kunna se hur mycket el man använder.

**English output:**
A prerequisite, to each one to help to reduce their electricity consumption, is to be able to see how much electricity you use.

**Errors:**
IW (Pr): The Swedish word ‘för’ should be translated to ‘for’ Not ‘to’
IW (V): The Swedish verb phrase ‘ska kunna bidra’ should translate to ‘be able to’ instead of “to help”
IW (P): The pronoun ‘you’ is better to be changed to ‘they’

**Corrected form:**
A prerequisite, for each one to be able to reduce their electricity consumption, is to be able to see how much electricity they use.

14. **Swedish input sentence**
Trots att Stångåstaden för det mesta inte är ägare av abonnemange av hushållselen*, ser vi det ändå som en del av vårt ansvar för miljö- och energifrågorna att jobba för en ökad energieffektivisering.

**English output:**
Despite the fact that the Stångåstaden for the most part, not the owner of the subscription of the domestic electricity, we see it anyway as part of our responsibility for environmental and energy issues to work for increased energy efficiency.

**Error:**
MW (V): Missing word in this case is the verb ‘is’ that should be placed before “not”

**Corrected form:**
Despite the fact that the Stångåstaden for the most part, is not the owner of the subscription of the domestic electricity, we see it anyway as part of our responsibility for environmental and energy issues to work for increased energy efficiency.

15. **Swedish input sentence**
Uppgifterna om elförbrukningen lämnas av Tekniska Verken och det är bara du som kan se dina egna värden.
English output:
The data on electricity consumption supplied by Tekniska Verken and only you can see your own values.

Errors:
IWF (V): The verb ‘supplied’ is incorrect form and should be changed to ‘is supplied’
NT (N): The Swedish phrase ‘Tekniska Verken’ has been not translated and should be translated to “Technical Office”

Corrected form:
The data on electricity consumption is supplied by Technical Office and only you can see your own values.
Text 2: “Hyrköp”

Hyrköp


Hyrköp är Stångåstadens bokoncept, där vi tar den ekonomiska risken och du som hyresgäst får valfriheten. Här kan du provbo medan du bestämmer dig, för med hyrköp väljer du själv när och om du vill köpa ditt hus.


Varför ska du välja hyrköp?

Konceptet ger dig som hyresgäst valfrihet och utrymme för förändringar av familjeförhållanden eller ekonomi. Hyrköp ger dig även möjlighet att lära känna ditt område och prova på en ny boendeform innan du köper. Hur ofta har du annars möjligheten att provbo innan du bestämmer dig för att köpa?

Hyrköp är ett bra val för:

• Barnfamiljer som har fullt upp och inte vill tänka på underhåll och avbetalningar men som i framtiden kan tänka sig att köpa sitt boende.
• Familjer och par som vill provbo området först och avvakta ett gynnsamt ränteläge.
• Par som är på väg att bilda familj men som inte har bestämt sig var eller hur man vill bo.
• Hushåll med osäker ekonomisk utveckling. Man kan ha drabbats av sjukdom, fått varsel om uppsägning eller funderar på att studera.
• De som inte vill eller kan binda sitt kapital just nu och vill avvakta med stora investeringar till dess att den ekonomiska situationen har stabiliserat sig.
• Nyinflyttade som vill bekanta sig med Linköping och under tiden bo bekvämt och bra med en hög servicenivå.
• De som har bott länge i lägenhet, men nu vill prova på hur det är att bo i hus innan man eventuellt bestämmer sig för att köpa ett.
Priset sätts från början, vilket gör att du kan tillgodogöra dig eventuell värdeökning vid köp. Om du gör investeringar i bostaden kommer även de att komma dig till hands när det är du som står som ägare.
A. Translation by Google translate (System 1)

_Hirepurchase_
In Ekängen we have couples and terraced with hyrköpsmöjlighet. A concept that we introduced for 2009. Rent first, buy later if you want. A unique opportunity for those who are or wish to become of Linköping.
Hire purchase is Stångåstaden bokoncept, where we take the financial risk and as a tenant you may choice. Here you can provbo while you decide, for the lease, you choose when and if you want to buy your house.
You start by renting, but have the option to buy the house from day one if you want.
Otherwise, continue to rent, and may at any time during the option period, decide when you want to buy the house at a fixed price from the beginning. You enter into a contract under the Rent Act and may at any time terminate the contract with three months notice.

**Why should you choose hire purchase?**

Concept allows you as a tenant choice and scope for changes in family relationships or finances. Lease purchase also allows you to get to know your area and try a new type of housing before buying. How often have you otherwise possibility provbo before you decide to buy?

**Hire purchase is a good choice for:**

- Families who are busy and do not want to think about maintenance and installments but which in the future may consider buying their accommodation.
- Families and couples who want provbo area first and wait for favorable interest rates.
- Couples who are about to start a family but have not decided where or how to live.
- Households with uncertain economic utvecklig. You may be experiencing illness, received layoff notices or thinking about studying.
- Those who are not willing or able to commit their capital right now and want to hold off on major investments until the economic situation has stabilized.
- New residents who want to familiarize themselves with Linköping and meanwhile live comfortably and well with a high level of service.
- Those who have lived long in the apartment, but now want to try how it is to live in the house before possibly deciding to buy one.
The price is set at the beginning, so you can assimilate a possible increase in the purchase. If you are investing in your home, they will also get you there when it's you who is the owner.
a) Errors in the translation Text 1 generated by System1

1. Swedish input sentence:
   Hyrköp
   **English output:**
   Hirepurchase
   **Error:**
   IWF (N): the Swedish word ‘Hyrköp’ should be written down to ‘Hire purchase’ instead of ‘Hirepurchase’
   **Corrected form:**
   Hire purchase

2. Swedish input sentence:
   I Ekängen har vi par- och radhus med hyrköpsmöjlighet.
   **English output:**
   In Ekängen we have couples and terraced with hyrköpsmöjlighet.
   **Errors:**
   IWF (N): The Swedish phrase ‘par- och radhus’ has been translated wrongly to ‘couples and terraced’ that should be translated to ‘duplex and town house’
   NT (N): The Swedish words ‘hyrköpsmöjlighet’ ‘Ekängen’ have not translated here. The first one is a proper noun that can not be translated but the second one should be translated to ‘Hire purchase option’
   **Corrected form:**
   In Ekängen we have duplex and town house with Hire purchase option.

3. Swedish input sentence:
   Ett koncept som vi introducerade 2009.
   **English output:**
   A concept that we introduced for 2009.
   **Error:**
   IWF (Pr): Incorrect word is the preposition ‘for’ that should be changed to ‘in’
   **Corrected form:**
   A concept that we introduced in 2009.

4. Swedish input sentence:
   En unik möjlighet för dig som är eller vill bli linköpingsbo.
   **English output:**
   A unique opportunity for those who are or wish to become of Linköping.
Errors:
IW (V): The Swedish verb ‘bli’ should be translated to ‘be’ instead of ‘become’
IW (N): The ‘linkopingbo’ should be translated to ‘inhabitant of linkoping’
Corrected form:
A unique opportunity for those who are or wish to be inhabitant of Linkoping.

5. Swedish input sentence:
Hyrköp är Stångåstaden bokoncept, där vi tar den ekonomiska risken och du som hyresgäst får valfriheten.

English output:
Hire purchase is Stångåstaden bokoncept, where we take the financial risk and as a tenant you may choice.

Errors:
IWF (GNP): In this case, ‘Stångåstaden’ should be used in genitive form ‘Stångåstaden’s’
NT: Not-translated word is ‘bokoncept’ that should translate to ‘housing concept’
IW: The ‘valfrihet’ is ‘freedom of choice’ not just ‘choice’, so ‘får valfriheten’ should be rendered as ‘get the freedom of choice’
Corrected form:
Hire purchase is Stångåstaden’s housing concept where we take the financial risk and you as a tenant get the freedom of choice.

6. Swedish input sentence:
Här kan du provbo medan du bestämmer dig, för med hyrköp väljer du själv när och om du vill köpa ditt hus.

English output:
Here you can provbo while you decide, for the lease, you choose when and if you want to buy your house.

Errors:
NT (V): The Swedish word ‘provbo’ has not been translated. It should be translated to ‘test stay/live’ in order to have a meaningful sentence.
IW (Pr): The ‘hyrköp’ should be translated to ‘Hire purchase’ Not ‘the lease’
IW (Pr): The preposition ‘om’ is better to be translated to ‘whether/if’
MW (Pr): The preposition ‘med’ has been missed. It should be translated to “with”
Corrected form:
Here you can test live while you decide, for with hire purchase, you choose when and whether you want to buy your house.

7. Swedish input sentence:
Annars fortsätter du att hyra, och kan när som helst under en optionsperiod bestämma när du vill köpa huset till ett från början fastställt pris.

English output:
Otherwise, continue to rent, and may at any time during the option period, decide when you want to buy your house at a fixed price from the beginning.

Errors:
MW (P): Missing word is the pronoun ‘you’ that should be placed before ‘continue’
WO: Incorrect word order is ‘at a fixed price’ that should change to ‘at a price fixed’
IWF: ‘the house’ should be changed to ‘a house’

Corrected form:
Otherwise, you continue to rent, and may at any time during the option period, decide when you want to buy a house at a price fixed from the beginning.

8. Swedish input sentence:
Du ingår ett avtal enligt hyreslagen och kan när som helst säga upp kontraktet, med tre månaders uppsägningstid.

English output:
You enter into a contract under the Rent Act and may at any time terminate the contract with three months notice.

Error:
IW (N): The Swedish word ‘hyreslagen’ is better to be translated to ‘Rent Law’ Not ‘Rent Act’

Corrected form:
You enter into a contract under the Rent Law and may at any time terminate the contract with three months notice.

9. Swedish input sentence:
Konceptet ger dig som hyresgäst valfrihet och utrymme för förändringar av familjeförhållanden eller ekonomi.
English output:
Concept allows you as a tenant choice and scope for changes in family relationships or finances.

Error:
MW (A): In this case, article ‘the’ is missed in translated text and should place before “concept” to have a correct sentence.
IW (V): The Swedish verb ‘valfrihet’ should be translated to ‘the freedom of choice’ Not to ‘choice’

Corrected form:
The concept allows you as a tenant the freedom of choice and scope for changes in family relationships or finances.

10. Swedish input sentence:
Hur ofta har du annars möjligheten att provbo innan du bestämmer dig för att köpa?

English output:
How often have you otherwise possibility provbo before you decide to buy?

Error:
NT (V): The word ‘provbo’ should translate to ‘test stay’

Corrected form:
How often have you otherwise possibility test stay before you decide to buy?

11. Swedish input sentence:
Barnfamiljer som har fullt upp och inte vill tänka på underhåll och avbetalningar men som i framtiden kan tänka sig att köpa sitt boende.

English output:
Families who are busy and do not want to think about maintenance and installments but which in the future may consider buying their accommodation.

Errors:
IWF (N): The noun ‘Barnfamiljer’ should be translated to ‘Families with children’
IW: The conjunction ‘som’ is better to be translated to ‘who’
WO (Ad): The adverb ‘in the future’ should place at the end of sentence

Corrected form:
Families with children who are busy and do not want to think about maintenance and installments but who may consider buying their accommodation in the future.
12. Swedish input sentence:
Familjer och par som vill provbo området först och avvaka ett gynnsamt ränteläge.

English output:
Families and couples who want provbo area first and wait for favorable interest rates.

Error:
NT (V): Since it has been mentioned ‘the area’ in this part, the Swedish word ‘provbo’ should be translated to ‘test’ NOT ‘Floorplanner’
IWF: The verb ‘vill’ is better to be translated to ‘want to’ instead of ‘want’.
IWF: In order to have the correct sentence, ‘the’ should be placed before ‘area’

Corrected form:
Families and couples who want to test the area first and wait for favorable interest rates.

13. Swedish input sentence:
Hushåll med osäker ekonomisk utvecklig. Man kan ha drabbats av sjukdom, fått varsel om uppsägning eller funderar på att studera.

English output:
Households with uncertain economic utvecklig. You may be experiencing illness, received layoff notices or thinking about studying.

Errors:
NT (N): The ‘utvecklig’ should be translated to ‘situation’
IW (Pr): The preposition ‘Man’ has been wrongly translated to ‘You’ that should be translated to ‘They’
IWF: The ‘funderar på’ should be translated to ‘are thinking about’ Not ‘thinking’
IW: The Swedish phrase ‘drabbats av sjukdom’ should be translated to ‘suffer from’

Corrected form:
Households with uncertain economic situation. They may be experiencing illness, received layoff notices or are thinking about studying.

14. Swedish input sentence:
De som inte vill eller kan binda sitt kapital just nu och vill avvaka med stora investeringar till dess att den ekonomiska situationen har stabiliserat sig.

English output:
Those who are not willing or able to commit their capital right now and want to hold off on major investments until the economic situation has stabilized.
Errors:
IW: The phrase ‘are not willing’ is better to be changed to ‘do not want’
IW (V): The Swedish verb ‘kan binda’ is wrongly translated to ‘able to commit’ that should translate to ‘can bind’
MW: The pronoun ‘dess’ has been missed and should be translated to ‘their’
IWF: The verb ‘has stabilized’ should be changed to ‘stabilize’

Corrected form:
Those who do not want or can bind their capital right now and want to hold off on major investments until their economic situation stabilize.

15. Swedish input sentence:
De som har bott länge i lägenhet, men nu vill prova på hur det är att bo i hus innan man eventuellt bestämmer sig för att köpa ett.
English output:
Those who have lived long in the apartment, but now want to try how it is to live in the house before possibly deciding to buy one.
Errors:
IW (A): Incorrect word is incorrect articles ‘the’ and should translate to ‘an’ before ‘apartment’ and ‘a’ before ‘house’
IWF: The phrase ‘how it is’ is better to be translated to ‘what it is like’

Corrected form:
Those who have lived long in an apartment, but now want to try what it is like to live in a house before possibly deciding to buy one.

16. Swedish input sentence:
Priset sätts från början, vilket gör att du kan tillgodogöra dig eventuell värdeökning vid köp. Om du gör investeringar i bostaden kommer även de att komma dig till hands när det är du som står som ägare.
English output:
The price is set at the beginning, so you can assimilate a possible increase in the purchase. If you are investing in your home, they will also get you there when it's you who is the owner.
Errors:
IW (V): Incorrect verb is ‘assimilate’ that should be changed to ‘profit from’
IW (P): The pronoun ‘they’ is unclear antecedent that should be changed with ‘these investments’
IW (V): The verb phrase ‘get you there’ is incorrect translation that should be replaced with ‘will benefit you’
IWF (V): Incorrect word form is the incorrect form of verb ‘is’ which is preceded ‘who’ that should be ‘are’ instead.

Corrected form:
The price is set at the beginning, so you can profit from a possible increase in the purchase. If you are investing in your home, these investments will also get you there when it's you who are the owner.
B. Translation by Microsoft Bing translate System (S2)

*Lease Purchase*

We have couple of Ekängen and terraced with hyrköpsmöjlighet. A concept that we introduced in 2009. Rent first and then, if you want to. A unique opportunity for those who are or would like to get rid of Linköping.

Hire purchase is Stångåstaden's bokoncept, where we take the financial risk and you as a tenant gets the freedom of choice. Here you can Floorplanner-while you decide, for with hire purchase you can choose when and where you want to buy your House.

You begin to rent, but has the option to buy the House from day one if you want. Otherwise, continue to rent, and may at any time during the option period to decide if you want to buy the House at a fixed price from the beginning. You enter into a contract under the law of rent and may at any time terminate the contract, with three months' notice.

*Why choose leasing?*

The concept gives you as a tenant choice and scope for changes in family circumstances or economics. Leasing also allows you to get to know your area and try on a new accommodation form before you buy. How often have you otherwise the possibility of Floorplanner-before you decide to buy?

*Hire purchase is a good choice for:*

- Families with children who are busy and do not want to think about maintenance and mortgage payments but that in the future might consider buying their accommodation.
- Families and couples who want to Floorplanner-area first and await a favourable interest rates.
- Couples who are about to start a family but has not decided where or how you want to live.
- Households with uncertain economic development. You may have been affected by the disease, received the termination notice or are looking to study.
- Those who do not want or can bind their capital right now and want to defer a major investment until the economic situation has stabilized.
- Recent newcomers who want to familiarize themselves with Linköping and meanwhile stay comfortable and fine with a high level of service.
• Those who have lived a long time in the apartment, but now want to try what it's like to live in the House before eventually decides to buy one.

The price is set from the beginning, which means that you can assimilate any increase in value when purchasing. If you make the investment in dwellings will also get you ready when it's you who is listed as the owner.
b) Errors in the translation Text 2 generated by system2

1. Swedish input sentence:
I Ekängen har vi par- och radhus med hyrköpsmöjlighet.

English output:
We have couple of Ekängen and terraced with hyrköpsmöjlighet.

Errors:
MW (Pr): The missing preposition ‘In’ should be written in the first of sentence
WO (Pn): The proper noun ‘Ekängen’ is in the wrong place and should be transfered to the first of the sentence, precede ‘In’

NT (N): The Swedish word ‘hyrköpsmöjlighet’ has not been translated here and should be translated to “Lease purchase option”
IW: The words ‘couple and terraced’ are absolutely wrong and should be replaced with ‘duplex and town house’
Corrected form:
In Ekängen we have duplex and town house with Lease purchase option.

2. Swedish input sentence:
Hyr först och köp sen, om du vill.

English output:
Rent first and then, if you want to.

Error:
MW (V): Missing word is the verb ‘buy’ that should be preceded ‘then’
Corrected form:
Rent first and then buy, if you want to.

3. Swedish input sentence:
En unik möjlighet för dig som är eller vill bli linköpingsbo.

English output:
A unique opportunity for those who are or would like to get rid of Linköping.

Errors:
IW (V): The Swedish verb ‘bli’ should be translated to ‘be’ instead of ‘get rid of’
Corrected form:
A unique opportunity for those who are or would like to be inhabitant of Linköping.
4. Swedish input sentence:
Hyrköp är Stångåstadens bokoncept, där vi tar den ekonomiska risken och du som hyresgäst får valfriheten.

English output:
Hire purchase is Stångåstaden's bokoncept, where we take the financial risk and you as a tenant Gets the freedom of choice.

Errors:
IWF (N): In this case, ‘Hyrköp’ has been translated to ‘Hire purchase’ that is different form of ‘Lease purchase’
NT: Not-translated word is ‘bokoncept’ that should translate to ‘housing concept’
IWF (V): The verb “Gets” has been written down in capital form and the third person that should be changed to ‘get’

Corrected form:
Lease purchase is Stångåstaden’s housing concept where we take the financial risk and you as a tenant get the freedom of choice.

5. Swedish input sentence:
Här kan du provbo medan du bestämmer dig, för med hyrköp väljer du själv när och om du vill köpa ditt hus.

English output:
Here you can Floorplanner-while you decide, for with hire purchase you can choose when and where you want to buy your House.

Errors:
IW (V): The Swedish word ‘provbo’ should be translated to ‘test stay’ NOT ‘Floorplanner’ to have a meaningful sentence.
IWF (N): Incorrect word form is ‘House’ that should be changed to ‘house’
IW (Con): The Swedish word ‘om’ should be translated to ‘whether’ NOT ‘where’
IWF (N): In this case, ‘Hyrköp’ has been translated to ‘Hire purchase’ that is different form of ‘Lease purchase’

Corrected form:
Here you can test stay while you decide, for with lease purchase; you can choose when and whether you want to buy your house.

5. Swedish input sentence:
Du börjar med att hyra, men har möjlighet att köpa huset från dag ett om du vill.
English output:
You begin to rent, but has the option to buy the House from day one if you want.

Error:
IWF (N): Incorrect word form is ‘the House’ that should be changed to ‘a house’
IWF (V): The verb ‘has’ is not in correct form and is not agree with its subjects so it should be changed to ‘have’ to be the correct form.

Corrected form:
You begin to rent, but have the option to buy a house from day one if you want.

7. Swedish input sentence:
Annars fortsätter du att hyra, och kan när som helst under en optionsperiod bestämma när du vill köpa huset till ett från början fastställt pris.

English output:
Otherwise, continue to rent, and may at any time during the option period to decide if you want to buy the House at a fixed price from the beginning.

Errors:
MW (P): Missing word is the pronoun ‘you’ as a subject of ‘continue’ that should place before ‘continue’
EW (Pr): The preposition of ‘to’ that has been written after ‘period’ is extra
IW (Con): The Swedish word ‘när’ should be translated to ‘when’ NOT ‘if’ in order to have a correct sentence.
IWF (N): Incorrect word form is ‘the House’ that should be changed to ‘a house’
WO: Incorrect word order is ‘at a fixed price’that should be changed to ‘at a price fixed’

Corrected form:
Otherwise, you continue to rent, and may at any time during the option period, decide when you want to buy a house at a price fixed from the beginning.

8. Swedish input sentence:
Konceptet ger dig som hyresgäst valfrihet och utrymme för förändringar av familjeförhållanden eller ekonomi.

English output:
The concept gives you as a tenant choice and scope for changes in family circumstances or economics.

IW: The Swedish word ‘valfrihet’ should be translated to ‘the freedom of choice’ Not just ‘choice’
**Corrected form:**
The concept gives you as a tenant the freedom of choice and scope for changes in family circumstances or economics.

**9. Swedish input sentence:**
Hyrköp ger dig även möjlighet att lära känna ditt område och prova på en ny boendeform innan du köper.

**English output:**
Leasing also allows you to get to know your area and try on a new accommodation form before you buy.

IW: The Swedish verb ‘prova på’ should be translated to ‘try’ Not ‘try on’

**Corrected form:**
Leasing also allows you to get to know your area and try a new accommodation form before you buy.

**10. Swedish input sentence:**
Hur ofta har du annars möjligheten att provbo innan du bestämmer dig för att köpa?

**English output:**
How often have you otherwise the possibility of Floorplanner-before you decide to buy?

Error:
IW (V): The Swedish word ‘provbo’ should be translated to ‘test stay’ NOT ‘Floorplanner’ in order to have a meaningful sentence.

**Corrected form:**
How often have you otherwise the possibility of test stay before you decide to buy?

**11. Swedish input sentence:**
Barnfamiljer som har fullt upp och inte vill tänka på underhåll och avbetalningar men som i framtiden kan tänka sig att köpa sitt boende.

**English output:**
Families with children who are busy and do not want to think about maintenance and mortgage payments but that in the future might consider buying their accommodation.

Errors:
IW: The ‘som’ is better to be translated to ‘who’ Not ‘that’
WO (Ad): The adverb of time “in the future” should be placed at the end of sentence
Corrected form:
Families with children who are busy and do not want to think about maintenance and mortgage payments but who might consider buying their accommodation in the future.

12. Swedish input sentence:
Familjer och par som vill provbo området först och avvakta ett gynnsamt ränteläge.

English output:
Families and couples who want to Floorplanner-area first and await a favourable interest rates

Errors:
IW (V): Since it has been mentioned ‘area’ in this part, the Swedish word ‘provbo” should be translated to ‘test’ NOT ‘Floorplanner’ to have a meaningful sentence.
IWF (N): Since “rates” is plural, ‘a’ should not used before it
IWF (N): ‘the’ should be placed before ‘area’

Corrected form:
Families and couples who want test the area first and await favorable interest rates.

13. Swedish input sentence:
Par som är på väg att bilda familj men som inte har bestämt sig var eller hur man vill bo.

English output:
Couples who are about to start a family but has not decided where or how you want to live.

Errors:
IWF (V): Incorrect word form is the verb ‘has not’, which did not agree with its subjects so it should be changed to “have not”
IWF (Pr): Incorrect word form is the incorrect pronoun ‘you’ that should be changed to ‘they’ in order to be agree with its subject.

Corrected form:
Couples who are about to start a family but have not decided where or how they want to live.

14. Swedish input sentence:
Hushåll med osäker ekonomisk utvecklig. Man kan ha drabbats av sjukdom, fått varsel om uppsägning eller funderar på att studera.

English output:
Households with uncertain economic development. You may have been affected by the disease, received the termination notice or are looking to study.
Errors:

IW (Pr): the preposition ‘Man’ has been translated to ‘You’ that is wrong and should be changed to ‘They’

IWF (Pr): The words ‘the disease and the termination’ are wrong and should be changed to ‘a the disease and a termination’

IW (V): The verb ‘funderar på att’ should be translated to ‘are thinking about’ NOT ‘are looking to’ that

IWF: The ‘study’ has been used in incorrect form and should be written down ‘studying’

IW: The phrase ‘drabbats av sjukdom’ should be translated to ‘suffer from illness’ Not ‘have been affected by’

Corrected form:

Households with uncertain economic development. They may suffer from disease, received a termination notice, or are thinking about studying.

15. Swedish input sentence:
De som inte vill eller kan binda sitt kapital just nu och vill avvakta med stora investeringar till dess att den ekonomiska situationen har stabiliserat sig.

English output:
Those who do not want or can bind their capital right now and want to defer a major investment until the economic situation has stabilized.

Errors:

MW (Pr): The missing word is the preposition of ‘to’ which should be placed after ‘want’

MW: The pronoun ‘dess’ has been missed and should be translated to ‘their’

IWF: The verb ‘has stabilized’ should be changed to ‘stabilize’

Corrected form:
Those who do not want to or can bind their capital right now and want to defer a major investment until their economic situation stabilize.

16. Swedish input sentence:
De som har bott länge i lägenhet, men nu vill prova på hur det är att bo i hus innan man eventuellt bestämmer sig för att köpa ett.

English output:
Those who have lived a long time in the apartment, but now want to try what it's like to live in the House before eventually decides to buy one.
Errors:

IW (A): Incorrect word is incorrect articles ‘the’ should be ‘an’ before ‘apartment’ and ‘a’ before ‘house’

IWF (N): Incorrect word form is the noun ‘House’ that should be ‘house’ Not in capital form.

IWF (V): The verb ‘decides’ should be changed to ‘deciding’

Corrected form:
Those who have lived long in an apartment, but now want to try what it is like to live in a house, before possibly deciding to buy one.

17. Swedish input sentence:
Priset sätts från början, vilket gör att du kan tillgodogöra dig eventuell värdeökning vid köp. Om du gör investeringar i bostaden kommer även de att komma dig till hands när det är du som står som ägare.

English output:
The price is set from the beginning, which means that you can assimilate any increase in value when purchasing. If you make the investment in dwellings, will also get you ready when it's you who is listed as the owner.

Errors:

IW (V): Incorrect verb is ‘assimilate’ that should be replaced with ‘profit from’

IW: Incorrect word is ‘get you ready’ that should be changed to ‘benefit you’

MW (D): The missing word is ‘the investment’ that should be placed before ‘will also’

IWF (V): Incorrect word form ‘is’ should be ‘are’.

IW (V): The preposition ‘vid’ should be translated to ‘of’ Not ‘when’

Corrected form:
The price is set from the beginning, which means that you can profit from any increase in value of purchasing. If you make the investment in dwellings, the investment will also benefit you when it's you who are listed as the owner.
Appendix C: Analysis of Cohesion chains

1. Text 1: “Framtidens TV”

A. Translation by Google Translate System

*Future TV*

A minor living with Future TV (S1)

Our personal reference (exophora) tenants were the first in Sweden to access Smart TV holonym (S1) services that make life more comfortable without it p.ref costing anything extra(S2). Besides additive conjunction digital television, you p.ref (exophora) get a wide range of entertainment and additive conjunction many practical utility services through Stångåstaden Accommodation Services in Future TV (S3) repetition (S1)

To start Future TV! (S4) repetition (S1)

Content in Future TV (S5) repetition (S1)

*About Future TV* (S6) repetition (S1)

Stångåstaden repetition (S3) long-term goal is to reduce the proportion of printed information in such stairwells with information repetition (information S4) by Future TV (repetition, S1) (S7). It p.ref (cataphoric, connected) is important that you p.ref (cataphoric) have connected your determiner reference equipment (S8).

Having problems with wiring? (S9) Get in touch with Com Hem's customer service meronymy (Stångåstaden Accommodation Services in Future TV S3) at it p.ref for future television special phone number 0775-17 17:17 so they personal reference can help you p.ref (cataphoric) (S10). Either by phone or through home visits (S11).

Enjoy!

*What do you p.ref (Cataphoric) think is the best comparative reference part of the Future TV repetition (S1)?* (S12).

- vote here demonstrative reference! (S13)

Did you p.ref (cataphoric) know that ... (S14).

... You p.ref (cataphoric) get messages about what's happening around your determiner reference accommodation in Future TV (S15) repetition (S1)

*Messages in Future TV* (S16) repetition (S1)

Future TV repetition (S1) was developed with a service for targeted synonym (developed S14) information repetition (S4), specifically adapted to every household (S17). Through a
symbol in zapbaren, the strip that comes up when temporal conjunction changing the TV channel, you p.ref (cataphoric) can see that conjunction a new message repetition (S15) is waiting (S18). Using the remote control is clicked the message repetition (S15) forward for reading (S19).

The service repetition (S17) is used to get information repetition (S17) that directly affects you p.ref (cataphoric) as a tenant, such that the water will be temporarily shut down or to the courtyard will be refurbished and additive conjunction so on (S20).

Look out! (S21).

**Energy Account in Future TV repetition (S17) (S22)**

In Future TV repetition (S22) - the key My personal reference (cataphoric) apartment - you p.ref (anaphoric) can now view statistics on your determiner reference (you) consumption of household electricity (S23).

A prerequisite, for each one personal reference should be able to help reduce their electricity consumption repetition (S23), is to see how much electricity you p.ref (anaphoric) use synonym (consumption S24) (S24). Although casual conjunction Stångåstaden repetition (S7) for the most part are not the owner of the subscription of household electricity *, we personal reference see it repetition (S8) anyway as part of our responsibility synonym (owner) to the environment and additive conjunction energy issues to work for increased antonym (reduce S24) energy repetition (S25) efficiency (S25).

The data on electricity consumption repetition (S23) supplied by Technical Office and additive conjunction it p.ref (cataphoric) is only you p.ref (anaphoric) who can see your determiner reference own values (S26).

in a few apartments include electricity repetition (S25) in the rent (S27)
The Future of TV

An easier daily life with the future of TV (S1)

Our p.ref (exophora) tenants was first in Sweden with access to smart tv holonym (for Future TV S1) services that make life more comfortable without it p.ref (anaphoric S2) costing anything extra (S2). In addition to additive conjunction digital tv gives you p.ref (exophora) a wide variety of entertainment and additive conjunction many practical commercial services via Stångåstaden's Accommodation Services in the future of TV repetition (S1) (S3).

To start the future of television! (S4) repetition (S1)

Content in the future of TV (S5) repetition (S1)

About The Future Of TV (S6) repetition (S1)

Stångåstaden's repetition (S3) objective is to reduce the proportion of printed information in the corridors, for example, with information repetition (information S4) by the future of TV (repetition, S1) (S7). It p.ref (Cataphoric) is important that you p.ref (cataphoric) have plugged in your determiner reference equipment (S8).

Do you personal reference (cataphoric) have a problem with the connection? (S9) Please contact customer service meronymy (Stångåstaden Accommodation Services in Future TV S3) at the Aminu Com for Future TV special phone number 0775-17 17 17 so they personal reference (anaphoric) can help you personal reference (cataphoric) (S10). Either by telephone or through home visits (S11).

Enjoy!

What do you personal reference (cataphoric) think is the best comparative reference thing about the future of TV repetition (S1)? (S12).

-vote here demonstrative reference! (S13)

Did you personal reference (cataphoric) know that... (S14).

... you personal reference (cataphoric) will receive messages about what is happening around your accommodation in Future TV repetition (S11)? (S15)

Messages in the future of TV repetition (S1) (S16)

The future of TV repetition (S7) has been developed with a service for targeted synonym (developed S14) information repetition (S4), specifically for each household (S17). Through an icon in the zapbaren, the Strip that comes up when temporal conjunction changing the tv channel, you personal reference (cataphoric) can see that conjunction a new message
repetition (S15) is waiting (S18). With the help of the remote control is clicked the message repetition (S15) for reading (S19).

The service repetition (S17) is used to get information repetition (S17) that directly concern you personal reference (cataphoric) as a tenant, for example, that the water will be turned off temporarily or to the courtyard to be re-equipped, etc. (S20)

Keep an eye out! (S21)

**Energy account in future of TV repetition (S17) (S22)**

The future of TV repetition (S17)— under the button my personal reference (cataphoric) apartment – you personal reference (anaphoric) can now see statistics on your determiner reference (you) consumption of household electricity(S23).

A prerequisite, to each one personal reference to help to reduce their electricity consumption repetition (S23), is to be able to see how much electricity you personal reference (anaphoric) use synonym (consumption S24) (S24). Despite casual conjunction the fact that the Stångåstaden repetition (S7) for the most part, not the owner of the subscription of the domestic electricity *, we personal reference (anaphoric) see it personal reference (anaphoric) anyway as part of our responsibility synonym (owner) for environmental and additive conjunction energy issues to work for increased antonym (reduce S24) energy repetition (S25) efficiency (S25).

The data on electricity consumption repetition (S23) supplied by Tekniska Verken and additive conjunction only you personal reference (anaphoric) can see your determiner reference own values.* (S26).

in a few apartments include household electricity repetition (S25) in the rent (S27)
2. Text 2: “Hyrköp”

A. Translation by Google Translate System (S1)

_Hire Purchase_

In Ekängen we p.reference (exophora) have couples and additive conjunction terraced with hyrköpsmöjlighet (S1). A concept that we p.reference (exophora) introduced for 2009 (S2). Rent first, buy later Antonym (rent & buy) if you p.reference (exophora) want (S3). A unique opportunity for those demonstrative reference who are or wish to become of Linköping (S4). Hire purchase is Stångåstaden bokoncept, where we p.reference (exophora) take the financial risk and additive conjunction as a tenant you p.reference (anaphoric) may choice (S5). Here demonstrative you p.reference (anaphoric) can provbo while you p.reference (anaphoric) decide, for the lease, you p.reference (anaphoric) choose when temporal conjunction and additive conjunction if you p.reference (anaphoric) want to buy your p.reference (determiner) house. (S6).

You p.reference (anaphoric) start by renting antonym (buy S6), but conjunction (contrast) have the option to buy antonym (renting S8) the house from day one if you p.reference (anaphoric) want (S7). Otherwise, continue to rent, and additive conjunction may at any time during the option period, decide when conjunction (temporal) you p.reference (anaphoric) want to buy repetition (S7) the house repetition (S7) at a fixed price from the beginning (S8). You p.reference (anaphoric) enter into a contract under the Rent Act and additive conjunction may at any time terminate the contract antonym (enter into a contract S9) with three months’ notice. (S9).

Why should you p.reference (anaphoric) choose hire purchase repetition (S5)? (S10).

Concept allows you p.reference (anaphoric) as a tenant choice and additive conjunction scope for changes in family relationships or finances (S11). Lease purchase synonym (hire purchase S10) also allows you p.reference (anaphoric) to get to know your determiner reference area and additive conjunction try a new type of housing before buying repetition (S8) (S12). How often have you p.reference (anaphoric) otherwise possibility provbo before you p.reference (anaphoric) decide to buy repetition (S8)? (S13).

_Hire purchase repetition (S10) is a good choice for: (S14)
• Families who are busy and additive conjunction do not want to think about maintenance and additive conjunction installments but conjunction (contrast) which in the future may consider buying repetition (S12) their p.reference determiner accommodation. (S15)
• Families and additive conjunction couples holonym (for Families) who want provbo area first and additive conjunction wait for favorable interest rates. (S16)
• Couples meronym (families S17) who are about to start a family repetition (S16) but conjunction (contrast) have not decided where or how to live. (S17)
• Households with uncertain economic utvecklig (S18). You p.reference (anaphoric) may be experiencing illness, received layoff notices or thinking about studying. (S19)
• Those demonstrative who are not willing or able to commit their reference determiner capital right now and additive conjunction want to hold off on major investments until the economic situation has stabilized. (S20)
• New residents who want to familiarize themselves reference determiner with Linköping and additive conjunction meanwhile live comfortably and additive conjunction well with a high level of service. (S21)
• Those demonstrative who have lived long in the apartment, but conjunction (contrast) now want to try how it reference (cataphoric) is to live in the house before possibly deciding to buy repetition (S8) one reference (anaphoric). (S22)

The price is set at the beginning, so you p.reference (anaphoric) can assimilate a possible increase in the purchase. (S23) If you p.reference (anaphoric) are investing in your p.reference determiner home, they personal reference (cataphoric) will also get you p.reference (anaphoric) there demonstrative when it's you p.reference (anaphoric) who is the owner. (S24)
B. Translation by Bing Translate System (S2)

**Lease Purchase**

We p/reference (exophora) have couple of Ekängen and additive conjunction terraced with hyrköpsmöjlighet (S1). A concept that we p/reference (exophora) introduced in 2009 (S2). Rent first and then, if you p/reference (exophora) want to (S3). A unique opportunity for those demonstrative reference who are or would like to get rid of Linköping (S4).

Hire purchase synonym (Lease Purchase) is Stångåstaden's bokoncept, where we p/reference (exophora) take the financial risk and additive conjunction you p/reference (exophora) as a tenant Gets the freedom of choice (S5). Here demonstrative you p/reference (anaphoric) can Floorplanner-while you p/reference (anaphoric) decide, for with hire purchase repetition (S5) you p/reference (anaphoric) can choose when temporal conjunction and additive conjunction where you p/reference (anaphoric) want to buy your p/reference (determiner) House (S6).

You p/reference (anaphoric) begin to rent antonym (buy S6), but conjunction (contrast) has the option to buy repetition (S6) the House from day one if you p/reference (anaphoric) want (S7). Otherwise, continue to rent, and additive conjunction may at any time during the option period to decide if you p/reference (anaphoric) want to buy repetition (S6) the House repetition (S7) at a fixed price from the beginning (S8). You p/reference (anaphoric) enter into a contract under the law of rent and additive conjunction may at any time terminate the contract antonym (enter into a contract S9), with three months ' notice (S9).

**Why choose leasing?** (S10).

The concept gives you p/reference (anaphoric) as a tenant choice and additive conjunction scope for changes in family circumstances or economics (S11). Leasing repetition (S10) also allows you p/reference (anaphoric) to get to know your determiner reference area and additive conjunction try on a new accommodation form before you p/reference (anaphoric) buy repetition (S8) (S12). How often have you p/reference (anaphoric) otherwise the possibility of Floorplanner-before you p/reference (anaphoric) decide to buy repetition (S12)? (S13)

**Hire purchase synonym (Lease Purchase) is a good choice for:** (S14)

- Families with children who are busy and additive conjunction do not want to think about maintenance and additive conjunction mortgage payments but conjunction (contrast) that in the future might consider buying repetition (S12) their reference determiner accommodation (S15).
• Families and additive conjunction couples holonym (for Families) who want to Floorplanner-area first and additive conjunction await a favourable interest rates. (S16)

• Couples meronym (families S17) who are about to start a family repetition (S16) but conjunction (contrast) has not decided where or how you p.reference (anaphoric) want to live. (S17)

• Households with uncertain economic development (S18). You p.reference (anaphoric) may have been affected by the disease, received the termination notice or are looking to study. (S19)

• Those demonstrative who do not want or can bind their reference determiner capital right now and additive conjunction want to defer a major investment until the economic situation has stabilized. (S20)

• Recent newcomers who want to familiarize themselves reference determiner with Linköping and additive conjunction meanwhile stay comfortable and additive conjunction fine with a high level of service. (S21)

• Those demonstrative who have lived a long time in the apartment, but conjunction (contrast) now want to try what it reference (cataphoric) is like to live in the House before eventually decides to buy repetition (S8) one reference (anaphoric). (S22)

The price is set from the beginning, which means that you p.reference (anaphoric) can assimilate any increase in value when purchasing (S23). If you p.reference (anaphoric) make the investment in dwellings will also get you p.reference (anaphoric) ready when it's you p.reference (anaphoric) who is listed as the owner (S24).