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# Old and New User Study Methods Combined – Linking Web Questionnaires with Log Files from the *Swedish Lexin Dictionary*

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## Abstract

The *Swedish Lexin Dictionary*, SLD, is an online Swedish monolingual learner's dictionary for immigrants at beginner's level (<http://lexin.nada.kth.se/lexin/>). The dictionary has a well-defined target group and an explicit purpose. Thus the intended use is very clear. Also worth noting is that the dictionary is frequently used. For these reasons, it is most interesting to examine the actual use of this dictionary. The SLD has recently been revised and the online search functions have been improved. The initial part of the paper briefly describes the SLD and the updating project. The main part of the paper reports on an ongoing study of the use and users of the SLD. The study has combined two methods: web questionnaire survey and log file analysis. Thanks to the linking between the questionnaire data and the log file data, issues concerning, for example, whether users really do what they say they do can be verified with greater certainty. The paper demonstrates an example of analysis, where the questionnaire answers of one user are compared with the same user's actual searches in the SLD. This analysis is but one example of many hundred possible analyses. Apart from the results of the user study, it will also be of great interest to evaluate the procedure of combining two methods within the same study in this way, as the combination has a chance to yield more reliable and valid results on dictionary users and user behaviour.

## 1. Introduction

The *Swedish Lexin Dictionary*, hereafter SLD, is a Swedish online monolingual learner's dictionary for immigrants at beginner's level (<http://lexin.nada.kth.se/lexin/>). The SLD has recently been revised and the online search functions have been improved. The initial part of this paper will briefly describe the SLD and the updating project. The main part of the paper will report on an ongoing study of the use and users of SLD, focussing on a presentation of the data. The user study combines two methods: web questionnaire survey and log file analysis. The purpose of the user study is – naturally – to examine the use and users of this particular online dictionary. However, the study also gives an opportunity to evaluate the procedure of combining the methods in question.

## 2. The Lexin project and the *Swedish Lexin Dictionary*, SLD

Lexin is a 30-year-old project with the purpose of producing dictionaries particularly suited to the teaching of Swedish to immigrants. One initial goal of the Lexin project was to compile a well-designed Swedish vocabulary that included various kinds of linguistic information (cf. Gellerstam 1999). The result was the first edition (a paper version) of the SLD (1984), containing about 18,000 lemmas. In later editions the lemma selection has increased to about 28,000. The lemma selection is adapted to the needs of the dictionary's target group in a very thorough way. It includes, for example, common words with related derivatives and frequent words from textbooks and teaching aids. All lemmas have been provided with comprehensive information typical of a general dictionary. In addition, it includes specific words covering special issues and institutions in Swedish society, along with factual information, for example *Högsta domstolen* ('the Supreme Court'), and the names of the political parties. The

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dictionary is mainly intended for reception, but also for production. What is more, 1,700 elementary words are described by means of pictures in a special section.

The Swedish vocabulary has served as a basis for a series of bilingual dictionaries. The Lexin project has so far generated about 20 bilingual dictionaries (paper and/or electronic), for example Swedish-Arabic, Swedish-Persian and Swedish-Somali. The project has also given rise to interesting collaborative projects within Nordic lexicography (cf. Hult et al. 2010).

Since 1994, all the Lexin dictionaries have been freely available online. The online versions have audible pronunciation. In addition to pictures, there are also animations, which makes it much easier to understand the meaning of certain verbs which are difficult to explain using illustrations – not to mention definitions.

### 3. The revision of the *Swedish Lexin Dictionary*, SLD

In 2008, the Language Council of Sweden initiated a project involving updating and improving the Lexin online dictionaries. First of all, a revision of the monolingual SLD had to be made.<sup>1</sup> There were three general principles governing the update (Malmgren in preparation). Firstly, to further emphasize the distinctive features of a learner's dictionary. Secondly, to avoid grammatical terminology – even more. Thirdly, in case of conflicts between reception and production aspects, the reception aspect would have preference. Interestingly, the results of the update, independently, often corresponded to the conclusions of Pálfi and Tarp (2009) in their critique – on the whole positive – of the Lexin dictionaries. For instance, they propose more synonyms and antonyms, more explicit valence information, lemmatization of idioms (in the revision of SLD, idioms were promoted to sub-lemmas), and, lastly, the use of a controlled vocabulary in definitions. A controlled vocabulary means that all the words in the definitions (including compounds and derivatives) should be found as lemmas, or at least as morphological examples. These words will therefore be found (almost) irrespective of which inflectional form they appear in. Also, the project's ambition was to avoid, as far as possible, difficult (and long) words in definitions.

As mentioned, the search options have also been improved. The two most considerable improvements are that i) every entry is now easily accessible from any inflectional form of the corresponding lemma, and ii) by double-clicking on any word in an article, this word will automatically be looked up.

### 4. The SLD user study: methods and data

The potential usefulness of user studies has long been acknowledged by researchers within the field of lexicography. Two well-known studies are Atkins and Varantola (1998) and Nesi (2000) (see Welker 2006 for an extensive bibliography of user studies). Still, there is much more to discover about the use and users of dictionaries, particularly when it comes to electronic dictionaries. Lexicographers are eager to customize their products to users' needs and behaviour (Verlinde and Binon 2010, Trap-Jensen 2010) and, fortunately, it seems researchers are equally eager to continue researching the needs and behaviour of dictionary users (Bogaards 2003, Lew 2011).

When it comes to methods employed in dictionary use research, the questionnaire is a traditional tool used in many studies of paper dictionary use, and it has also been used to study online dictionary use (Hult 2008a). Analysis of log files is a relatively new tool and

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earlier studies have all demonstrated its benefits, both concerning the improvement potential of the lexicographic content and the development of new search possibilities (de Schryver and Joffe 2004, Bergenholtz and Johnsson 2005, Měchura 2008, Hult 2008b, Lorentzen and Theilgaard (in preparation)). However both methods have disadvantages. With questionnaires, one disadvantage concerns the issue of recollection of dictionary behaviour (cf. Tarp 2008). Such questions may only reflect the respondents' opinion of their consultation behaviour, not their actual use. Therefore, retrospective questions requiring users' recollection of consultation behaviour can cause problems of reliability. With log files, although we get data on the actual use of the dictionary, we cannot know for what purpose the dictionary is used or if the users are satisfied with the information they receive. Also, until recently (see e.g. Tono 2011) it has normally not been possible to get details about the use of different microstructure categories. Therefore, as the only method used, a web questionnaire survey or a log file analysis might be of limited use. In order to obtain more valuable results, it is necessary to combine these or other methods within the same study. That is what this study aims to do. As already stated, the present user study has combined two methods. This has resulted in three kinds of data: questionnaire answers, a look-up log and a navigation log (see below). The data were collected on two occasions, during one autumn week in 2008 and during the same week in 2011.<sup>2</sup>

#### 4.1. *The web questionnaire survey*

The web questionnaire survey was displayed on the SLD website during week 40 in 2011. It is a more elaborate version of a pilot study carried out in 2007 (Hult 2008a). It comprised a total of 20 questions, in two parts. The first part included questions about the user's age, gender, occupation and education. These questions were followed by inquiries about the user's searches in the dictionary, for example, the purpose of using the SLD, which categories of information the user mostly search for, and how language-specific problems are solved when not using the SLD. The second part of the questionnaire focussed on the target group, that is L2-speakers, and contained questions about mother tongue(s), education in native country, year of arrival in Sweden, which Swedish courses they have attended, which language they use in which situation, and more. In total, 863 questionnaires were submitted.

#### 4.2. *The log files*

There are two types of log files, namely files of look-ups and files of users' navigation on the website. (Cf. Almind 2008, who clearly demonstrates the two types of log files and their potential use.) The data collected in 2008 consist only of the first type of logs, like most other studies, namely look-ups. It includes data on search string, time of day and whether the search is successful or not (that is, if it resulted in a hit or not). The number of searches during the week in question was just below 154,000. These data represent the SLD from before the revision.

The data collected during week 40 in 2011 contain much more information. Firstly, the look-up log includes, unlike the 2008 data, IP addresses. The number of searches is somewhat greater, namely about 160,600, distributed over 20,641 IP addresses, resulting in 7.8 searches/IP address. Secondly, the 2011 data also have a navigation log, which displays the users' navigation on the website. During week 40, the settings had been manipulated and the following five information categories had been removed (unchecked) from the dictionary

articles: inflection, examples, valency, compounds and expressions. The users were informed of the ongoing study and encouraged to manually change the settings back to default, if they wanted to. Moreover, the links to audible pronunciation, film sequences and pictures were also logged, as well as the “save words” button and the question mark button (i.e. a link to a “useful hints” document).

## 5. The SLD user study: analysis

The questionnaire data and the log file data will surely lead to interesting results when analysed separately, for example if comparing the log files from before and after the revision of the SLD. However, the main purpose of the present study is to examine the use and users by combining the two methods in question. The questionnaire data and the two types of log file data were collected during the exact same time and could therefore be linked to one another. To give an example from the 2011 data: The IP address nnn.nn.nn.nnn is linked to a questionnaire with the ID number 779404871-511698425. From the questionnaire we discover, among other things, that the informant is a woman, we can call her Aor, whose current employment is studying. Aor came to Sweden in 2007 and has taken three courses in Swedish. Her mother tongue is Thai. She speaks Swedish every day, but with her friends and at school she also communicates in Thai and English. She has a university degree from her native country. Aor uses the SLD several times a week, and she often wants information on part of speech, inflection, abbreviation, meaning, compounds, example, and idiomatic expressions. She also states that she sometimes looks at the pictures but never at the film sequences. When Aor is not using the SLD to solve language specific problems, she uses Google or asks someone.

From the log files we find out more about Aor’s actual activities on the SLD, which are listed in Table 1.

**Table 1.** The activities of Aor, including information of day of the week and time of day.

Day	Time	Activity	
04	10:44:20	Corr:	urspråk → burspråk
04	10:44:35	Questionnaire:	779404871-511698425
04	11:25:22	Corr:	skilda sig → skilja sig
04	11:28:10	Corr:	gå ut på → gått på
04	11:34:21	Corr:	livmedel → livsmedel
05	15:15:04	Checking inflection	
05	15:15:05	Checking example	
05	15:15:06	Checking valency	
05	15:15:06	Unchecking valency	
05	15:15:07	Checking compounds	
05	15:15:08	Checking expressions	
05	15:15:17	Lookup:	bok
06	13:13:26	Lookup:	överskådlig
06	14:11:49	Looked up saved words:	0
07	16:41:04	Looked up saved words:	0
07	16:41:26	Corr:	tarzan → 32
09	13:35:14	Looked up saved words:	0

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Aor's first search in the SLD was performed on October 4 at 10:44:20 a.m., and the search string, *urspråk* ('primitive language'), has been automatically corrected (Corr) to *burspråk* ('oriel'), as the word *urspråk* is not found in the SLD and the nearest form (phonetically) is *burspråk*. In order to continue searching she has, at this point, to make a choice whether to fill in the questionnaire or not, and as we already know, she chooses to fill it in. She does this some time between 10:44:35 and 11:25:22 a.m. The following three searches are also automatically corrected into an existing lemma, as was the case with the first one. The next day, October 5, Aor has, presumably, read on the Lexin website that a study is currently carried out, and in order to view all possible information in the articles, she has to change the settings manually. As we can see, she chooses to check all the information categories that had been unchecked (apart from valency, which is, again, unchecked). Then, she performs one more search that day. The following days she makes further searches in the SLD, though very few. The search for *tarzan*, for example, is not found in the SLD, but this time Aor is offered 32 phonetically similar words that the dictionary contains. Comparing with what we know from the questionnaire, the log file can, for instance, verify that Aor actually uses the SLD several times a week, as we have records from five days out of seven. We can also verify that she never, or at least not this week, clicks on the links to film sequences.

The example of Aor demonstrates the unique possibility to register dictionary behaviour in real time. Thanks to the linking between the questionnaires and the log file data, issues concerning, for example, whether users really do what they say they do can now be verified with greater certainty. It should be noted, though, that although one cannot fully ascertain that the activities in the log file data only belong to the person behind the questionnaire, it is – in the case of Aor and many others – most likely. Accordingly, the analysis of Aor is but one example of many hundred possible analyses.

## 6. Concluding remarks

The analysis has just begun, and the conclusions are yet to be made. The user study will no doubt lead to interesting results, and will eventually be expanded into a thesis. Lexin is a project with a very clear purpose and the Lexin dictionaries have a well-defined target group. Also worth noting is that the dictionaries are frequently used. For these reasons, I find it most interesting to examine the actual use of these dictionaries, in this case the SLD. I will, as with the example of Aor, continue the analyses of the linked data of web questionnaires and the two types of log files. This makes it possible to, in real time, find out what users are actually doing and compare that with what they say that they do. I will also carry out a comparative study of the log file data of look-ups from before and after the revision of the SLD, to see what differences there are and whether they may be due to the revised content and search functions. Moreover, it is of great interest to evaluate the procedure of combining two methods within the same study, as the combination has a chance to yield more reliable and valid results on dictionary users and user behaviour.

## Notes

<sup>1</sup> This work was carried out at the Centre for Lexicology and Lexicography at the University of Gothenburg, Sweden, and was finished in 2010, under the head of professor Sven-Göran Malmgren.

<sup>2</sup> Many thanks to Viggo Kann, professor in computer science at the Royal Institute of Technology in Stockholm, Sweden, and Christian Sjögreen, systems engineer at the Centre for lexicology and lexicography at University of Gothenburg, for helping me in the process of collecting and handling the data.

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