The Klagenfurt lexicon database for sign languages as a web application:

LedaSila, a free sign language database for international use

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Abstract

The Klagenfurt on-line database for sign languages "LedaSila" (Lexical Database for Sign Languages, http://ledasila.uni-klu.ac.at/) is designed in such a way that it is possible to present all the information which can be found in any good monolingual or bilingual (printed) dictionary. It offers the possibility to enter semantic, pragmatic as well as morphosyntactic information. Furthermore, a detailed analysis of the non-manual and manual parameters of a sign is possible. For single signs and for the afore-mentioned areas, sign language examples in form of videos can be up-loaded. The videos are not restricted to a single format, although the Apple QuickTime® video format (.mov) is recommended, as it provides the best quality in relation to size.

LedaSila offers the possibility to search for any information already contained in it (including single signs or formational parameters, naturally), to document a sign language, or analyse it linguistically. The search function is accessible to all internet users. In case someone wants to use the database for sign language documentation and/or analyses which necessitate the insertion of any data, an authorisation from the Centre for Sign Language and Deaf Communication in Klagenfurt is required.

When using LedaSila for documentation and/or analysis of a sign, a user does not have to follow a specific order when entering the data. Another advantage of this database is that the user is free to decide whether to enter data only in one field (e.g. semantics or region) or to do a full analysis of the sign. A special feature of LedaSila is the possibility to add new categories and values at any time. This is especially important for an analysis tool which is designed to be used internationally. This feature ensures that all categories and values needed for a specific sign language are available.

LedaSila can be used free of charge for non-commercial deaf and scientific issues. The only requirements for using this database are a fast Internet connection and the Internet Explorer 5.5 or higher. The database is hosted on a server of the University of Klagenfurt. All information (including videos) is stored directly on the web server. This means that using LedaSila comes with zero administration. The server at the University of Klagenfurt is operated by the central IT department ensuring data backups and other administrative server supervision. The international sign language linguistic community is invited to take advantage of this easily manageable database.

1. Introduction

A description of the original database on the basis of which the current version was developed can be found in Krammer et al. (2001). From the point of view of the Centre for Sign Language and Deaf Communication (Zentrum für Gebärdensprache und Hörbehinderten-kommunikation, ZGH), it was imperative to provide a sign language database which offered free access. Many institutions which do sign language research operate on a relatively low budget which prevents them from purchasing the necessary software, thus making their work difficult. With the Klagenfurt database "LedaSila" (http://ledasila.uni-klu.ac.at/), there is now finally a free tool available for all sign language analysts as well as other interested parties.

2. Technical aspects

2.1 Programming

LedaSila is implemented as a pure web application which can be accessed via http://ledasila.uni-klu.ac.at. This means that no installation is necessary on the client server; the application can be fully operated on the web browser. The website was programmed in ASP (Active Server Pages). This is a Microsoft technology which enables the programming of dynamic web pages. Server related applications which are needed for automatic notifications have been programmed in Microsoft .NET 2003 (Visual Basic).

The system is hosted on a Windows 2003 server of the University of Klagenfurt. All information (including videos) is stored directly on the web server.

2.2 Client requirements

2.2.1. Hardware

For users who will administrate LedaSila – and will thus use the web framework – a computer with a central memory of 256 MB is recommended. The website and additional applications have been developed for a resolution of 1024 x 768 pixels.

As for the Internet connection, it is recommended that users who will administrate the application have a broadband connection.

2.2.2. Software

As many people still use Microsoft's Internet Explorer for browsing web pages and this browser is also standard at the University of Klagenfurt, the design has been optimised for Internet Explorer 5.5 and higher. This

browser is recommended for an optimal use of the search function – for the entering of data it is even a requirement. LedaSila uses the Apple QuickTime® video format (.mov) as this seems to provide the best quality compared to size. Although other video formats would be possible, QuickTime videos can be displayed directly within the web page. For other video types, the corresponding player needs to be installed on the accessing clients.

2.3 Multi-language feature

LedaSila is a multi-language application. At this moment, the languages German and English are available and can be switched any time. When LedaSila is used in projects in other countries, new languages can be added rather easily. On request for the inclusion of a new application language, the respective project team obtains a list of phrases and words used in LedaSila for translation. The translated phrases are then included as a new language into LedaSila by ZGH. Although the complete translation could be performed within LedaSila using its National Language Support (NLS) module, it is more convenient to perform the translation in a separate editor beforehand. Minor modifications to the translation can be directly performed within LedaSila.

It is also possible to translate only the categories and values and leave labels and application messages in English. This dramatically diminishes the necessary efforts for including a new language into the system and might be sufficient for the use in academic environments, in which English user interfaces should not be a show-stopper.

2.4 Openness of the set of categories

The descriptive values of a sign are not hard coded, and can thus be expanded with new items at any time. New descriptive values can be directly entered in the application by using the web interface, without changing the program. At the moment, new categories and values can only be added or removed by the administrator. The administrator function is performed by a collaborator of the ZGH. If a project leader of another project wants to enter a new category or a new value, this has to be arranged with and agreed on with the administrator. All new categories and values have to be translated into all languages available in the database. This arrangement and the central administration of this function guarantee that there will be no overlapping of entries.

3. Practical Use of LedaSila

In brief, the database consists of two areas which will be described here: a general search function which does not require any registration (i.e. accessible to all Internet users) and a "restricted analysis area" which requires a log-in. Before choosing one of these functions, a user can select the application languages (at the moment German and English) by clicking on the respective flag icon down left (cf. Figure 1).
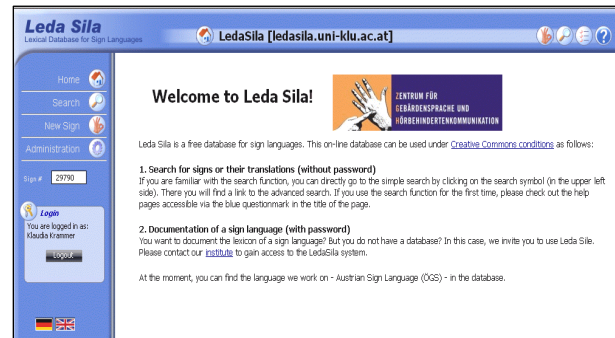

Figure 1: Welcome screen of LedaSila

The help texts in the database are currently available in German and English. The ZGH is working on a translation into Austrian Sign Language (Österreichische Gebärdensprache, ÖGS) and into International Sign (IS). The written help texts can be called up by clicking on the button "?" (cf. Figure 1). On the written help page, there will then appear two more buttons, labelled "ÖGS" and "IS".

3.1 Search function

The users may search for signs in the database in three different ways: simple search, advanced search or via the number of the sign.

3.1.1. Simple search

Clicking on the button "Search" will lead to the "Simple search" page (cf. Figure 2[1]). In this search mask, the users may choose between the following options:

- Semantics
- Region
- Type of sign
- Place of articulation
- Hand shape
- Word field.

For the option "Semantics", the users will get an empty text field. If they type in e.g. "evening", all signs with "evening" in their semantic entries will be displayed. For some other criteria, the values may be selected from a list. As especially the categories "Place of articulation" and "Hand shape" have a large number of values, graphics were implemented in order to facilitate the choice. By clicking on the green arrow to the right of the selection field, a window containing the graphics will open. The users may click on the chosen value directly in this window; the value will then be automatically transferred into the selection field.

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[1] Figures 2, 3, and 4 are clippings from the full screen (cf. Figure 1).

Figure 2: Simple search

After the selection of categories and values, the search will be started by clicking on the button "search". The results will be displayed as a list (cf. Figure 3).

Figure 3: Search results

When you click on the number of a sign (to the left of "Semantics"), the analysis of the sign will be displayed. For each sign entered into the database, there are two videos available: one with high (H) resolution and one with low (L) resolution. A click on the respective symbol will start the video in a new window. If a sign has variants, these will be shown in the results via links (cf. Figure 3). For example, the ÖGS-sign "guten Abend" has six variants. The users may call up the variants by clicking on the indicated total number (e.g. *6 Links*) of the variants.

If the search results do not fit onto a single page, the users may navigate between the different pages via the usual "previous page" / "next page" function. Using the option "Save result list as text file" the list will be saved on a local drive.

3.1.2. Advanced search

If a user should need more search criteria than are offered by the simple search, they have to click on the button "advanced" which leads to the "advanced search". On this page, search criteria may be selected and combined in a user-defined way, by clicking on "add filter" (cf. Figure 4). Search criteria may be deleted at all times by using the function "delete filter". For each category, the users may choose which values should correspond (=) or not correspond (<>) to it. Additionally, it is possible to combine the search criteria with "and" or "or", according to the rule "and" comes before "or".

Figure 4: Advanced search

Similar to the simple search, the advanced search is started by clicking on "search". The results are again displayed as a list.

3.1.3. Entering the sign number

Each sign is automatically assigned an unambiguous number. This number allows direct access to the sign. For this, the number has to be entered into the input field "Sign #" (cf. Figure 5), followed by the enter key. The sign will be immediately displayed in a detailed view. Given that the user has the necessary authorisation, it can also be edited. This kind of search is of special advantage for analysts, because this ensures quick access to a sign.

3.2 Input area

In order to be able to work in the input area, the users will need an authorisation assigned by the ZGH. Together with this authorisation, the users will be given a "role" and the respective rights. In special cases, it is also possible to assign rights which are not originally defined in the role of a user. The following roles are defined in the user concept:
- An "administrator" has full administrative rights for all functions of the database. (This role is taken on by a collaborator of ZGH.) An administrator may e.g. manage users and authorisations, carry out translations, edit the sign analyses of other users and manage projects.
- A "project leader" serves as "local" user administrator. They may assign rights to other project users or edit signs which have been entered in the course of the project. They are not able to edit categories, values or specifications. Such changes can only be done after consulting the administrator.
- An "analyst" is able to enter, analyse and edit signs. They can only modify signs that have been entered by them, though.

3.2.1. General guidelines

After entering their user names and passwords, the users can access the input area for a sign analysis. Depending on the role of a user, there are different editing options available. For an "analyst", for example, the area "administration" will not be displayed, but the button "New Sign" will appear (cf. Figure 5).

3.2.1.1. Elements of navigation in the input windows

There are two different kinds of input windows: the general presentation of a sign (cf. Figure 5), which is opened by clicking on the button "New Sign" and the

specific analysis masks. The hyperlinks which lead to the specific analysis masks are arranged in the general presentation of a sign (cf. Figure 5). By clicking on a link (e.g. Edit Semantics), the respective analysis mask is opened. In the specific analysis masks, the buttons "OK" and "Cancel" are always available in the right lower corner. By clicking on the button "OK", the entered data will be confirmed and saved; the user automatically comes back to the general presentation of the sign. All entered data can be deleted by clicking on the button "Cancel".

For a quick and consistent entering of data, there are selection windows for specific input fields. When there is a selection window, this is indicated by a small grey field with three dots right to the input field (cf. Figure 10). By clicking on this field, the window will open.

Graphic representations of the entries are always available when there is a green button with a white arrow beside the input field (cf. Figure 11). The selection window can be opened by clicking on this arrow.

3.2.1.2. Entering a new sign

There are two ways to enter a new sign: either new data may be entered, or an already analysed sign may be copied with the link "Copy sign", thereby getting a new sign number. The user may then edit the data for a new sign (using the copy) without changing the entries of the original sign.

3.2.1.3. Entering the data

When entering the data, the user does not have to keep to a certain order. There is also no obligation to fill in a fixed number of entries. Both a single entry and a full analysis are possible. This flexibility allows a quick input of signs into the database where they can be called up again via their number and edited. Through the possibility of a minimal entry, the database can be used either as a simple word list or for a complex scientific description.

3.2.1.4. Adding new categories and values

It is a special feature of this database that new categories and values may be added at any time. This is especially important for a database intended for international sign analysis. It is possible that the existing categories/values are sufficient for the analysis of Austrian Sign Language (ÖGS), but not for a detailed analysis of other sign languages. If a new category or value is needed, the administrator must be contacted by the analyst (cf. also 2.4.).

3.2.2. Sign analysis

The general presentation of a sign is opened by the button "New Sign". This mask is divided into several areas where data may be entered (cf. Figure 5). The following description adheres to this division.

Figure 5: General presentation of a sign

3.2.2.1. Video upload

Videos may be uploaded for the areas "Sign", "Semantics", "Pragmatics" and "Morphosyntax". A click on "Edit videos" will open a new window (cf. Figure 6 [2]), in which the video file can be selected by using the button "Search". The correct assignment to the respective category (e.g. "Sign") has to be done in the area "Category". It is also necessary to choose the video quality (high or low); an explanatory note accompanying the video is optional.

Figure 6: Working area "Edit videos"

After all the data have been entered, the video may be uploaded by clicking on the button "Start upload". Videos are directly uploaded to the web server. Subsequent access to uploaded videos is only available via the application. LedaSila takes care about where to store videos and therefore helps to avoid inconsistencies which might occur when linking videos to different signs. A video may be deleted via the hyperlink "Delete video" at any time.

3.2.2.2. Linking of signs

If a sign has one or more variants, these can be linked to each other, so that their semantic relationship can be displayed. Links can be created by using the hyperlink "Links". By this, a new window will be opened in which the respective sign number may be entered in the field "#"; the new link will be created by clicking on the button "Add".

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[2] Figures 5 - 12 are clippings from the full view.

Links are always bi-directional, this means if sign A is linked to sign B, sign B is automatically linked to sign A.

3.2.2.3. Sign information

In order to be able to enter something into this area, the analyst has to click on "Edit sign information", thereby opening the respective selection window. Here, the user may enter general information about a sign: type of sign (one handed, symmetric, asymmetric, and combined), person (name of the signer) and region in which the sign is used. Where necessary, a comment can be added.

The names of signers which have already been entered into the database can be called up as selection list. If the user wants to add a new name, it can be typed in into the field "Signer". The new name is automatically added to the selection list.

Since it is possible that a sign is used in several regions, more than one region may be selected. In case a region is not yet in the list, it may be entered like a new signer name.

3.2.2.4. Semantic information

In the area "Semantics", the meaning of a sign is entered. If a direct translation into the respective spoken language is impossible, the meaning can be described in the field "Paraphrase". In addition, information about "Connotative meaning", "Etymology" and "Language change" may be given. For the sign example, input fields are available for the glosses and the translation (cf. Figure 7).
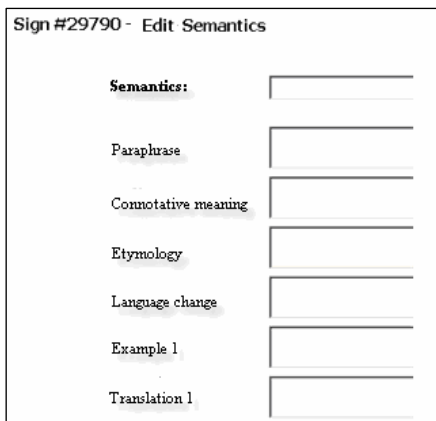

Figure 7: Possible entries in "Semantics"

Also in this area, not all information has to be entered at once. It is useful to enter first the respective meanings of the sign into the field "Semantics". This is important because the search function of the database is designed in a way that the entries in this field are searched for matches with the search word. All other related entries may be filled in later at any time.

3.2.2.5. Pragmatic information

The input field for pragmatic entries is similarly designed as the one for semantic information. It only differs in the labels for the entries. Data can be entered for "Usage", "Collocation", "Phrase" and "Idiom". Equally to

"Semantics", there are input fields for the glosses and translation of the sign example.

3.2.2.6. Mophosyntactic information

The morphosyntactic categories are displayed by means of a tree structure (cf. Figure 8). In this way, the syntactic categories can be clearly presented and the structure facilitates the selection by the user. Since signs can often be assigned to more than one word class (e.g. noun and verb), it is necessary that this can also be recorded in the analysis. For this reason, the user has the possibility to select several syntactic categories and transfer them to the general presentation of the sign.
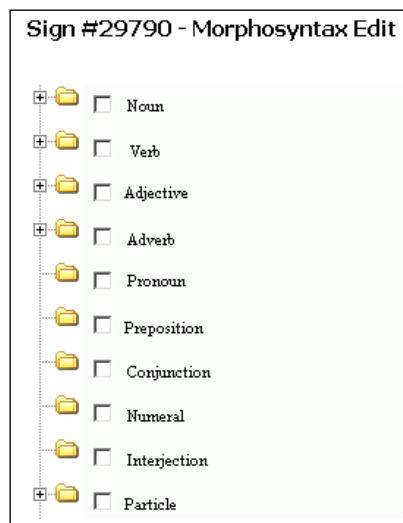

Figure 8: Selection options in "Morphosyntax"

3.2.2.7. Semantic field

A sign may be assigned one or more "semantic field(s)". At the moment, a user can choose among more than 100 semantic fields (Figure 9 shows a part of these semantic fields). The selection of a semantic field is done by clicking on the box in front of it.
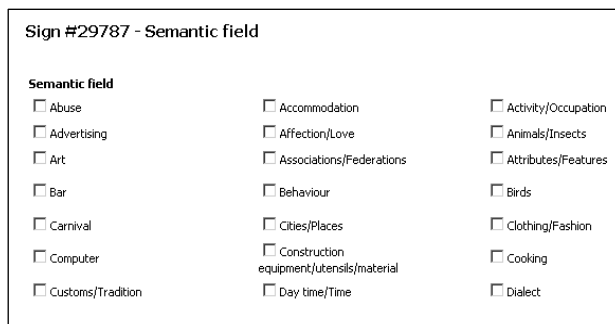

Figure 9: Clipping of selection window "Semantic field"

3.2.2.8. Non manual components

In this window, there are input fields for the categories "Facial expression", "Mouthing", "Mouth gesture", "Head", "Shoulder" and "Upper part of the body" (cf. Figure 10).

Figure 10: Selection window "Non manual components"

Values which are in the selection list can be transferred to the input field by clicking on them; new values may simply be entered in the input fields. It is possible to analyse only one (e.g. Facial expression) or more categories (e.g. Facial expression and Mouthing).

3.2.2.9. Manual components: Analysis of sign phases

Though the discussion on order/hierarchy of sign parameters is still ongoing (cf. Dotter 2000; 2007), we decided to use a phenomenologically arguable structuring of signs into phases, following the principal observations by Liddell & Johnson (1989). By this solution, the big number of parameters can be distributed into two sets which follow from the observation of the signs rather naturally. This practice is a "phonetic" one which gurantees that the analyses can be read by all linguists independent of their different "phonemic" orientation without obeying any theoretical model. In order to analyse a sign by phases, the user has to open the editing window by clicking on the link "Add phase 1" (cf. Figure 11). Now the user has to decide whether the sign starts with a hold or a movement phase. The list of categories and values is connected to the selection of the phase. In other words, if the phase "Hold" is selected, the selection list of the input field "Category" contains all categories assigned to this phase: Hand shape, Place of articulation, Palm orientation, Direction of the knuckles, Wrist, Point of contact and Type of contact. If now the category "Hand shape" is selected, the selection list of the input field "Value" shows the respective values. In this case, these are the descriptions of more than 150 hand shapes currently available in the database. In order to facilitate the selection of a hand shape, the user may call up the graphic presentations of these hand shapes (by clicking on the green button with the white arrow). Here, the chosen hand shape can be directly selected. In some cases, a "Specification" of values is needed. For example, a place of articulation may be specified by "close to".

Figure 11: Analysis of the individual phases

When the analysis of the category "Hand shape" is finished, the next category (e.g. Place of articulation) may be added by clicking on the link "add new category". The analysis procedure is the same as described for the category "Hand shape". When all desired categories of the phase "Hold" are analysed, the data are transferred to the general presentation of the sign by clicking on "OK". If the hold phase is followed by a movement phase, the user will click on the link "add phase 2" to enter again the analysis area of the individual phases and will choose "Movement" as type of phase. The selections of the categories and the values as well as the transfer of the data to the general presentation of the sign take place in the same way as in the hold phase. The categories and values for the non dominant hand may be entered in the same manner. Figure 12 shows the analysis of the ÖGS-sign "der Abend", as it appears in the general presentation.

Figure 12: General presentation of the
ÖGS-sign "der Abend" ["evening"]

In some cases, it may be necessary to add a comment on the analysis of a sign. For this purpose, the field "Comment" may be used.

3.2.2.10. Statistics

The last area in the general presentation of a sign contains statistical data, which are automatically generated by the system. They show the assignment of the (analysed) sign to a project, the name of the person who has entered the sign and the name of the person who has last modified the sign (cf. Figure 5). These data cannot be viewed by anonymous users, only by registered ones.

3.2.3. Current status

So far, the database has only been used for the description of ÖGS. At the moment, LedaSila contains about 14.000 sign (videos) of Austrian Sign Language. These are regional sign variants as well as 3.400 standardised ÖGS-signs.

The priority objective of ZGH was to enter available sign videos into the database. This explains why only about 400 signs of the complete corpus have been analysed so far. For the near future, it is planned to accelerate the analysis of signs, which will mainly be carried through by the deaf collaborators of ZGH.

3.2.4. Invitation to the Sign Language Linguistics Community

We specifically want to invite deaf researchers and, of course, also all other parties interested in sign language to use the free database for documentation and/or analysis of their sign language(s). A first impression of the database can be gained by visiting http://ledasila.uni-klu.ac.at/. If you are interested in further information, please contact Klaudia Krammer from ZGH:

(klaudia.krammer@uni-klu.ac.at).

Researchers and other parties who accept this offer and enter sign language data into the database agree to share their data with the Sign Language Linguistics Community. This in turn contributes to improving the international research networking.

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