



# **What's new in SignStream® 3.3.0 ?**

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**Report No. 17**  
**American Sign Language**  
**Linguistic Research Project**  
<http://www.bu.edu/asllrp/>

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This document describes changes for version 3.3 from what is described in:

***A User's Guide to SignStream® 3*** (C. Neidle, Report No. 15 American Sign Language Linguistic Research Project, 2017) and in

***What's new in SignStream 3.1.0?*** (C. Neidle, Report No. 16 American Sign Language Linguistic Research Project, 2018)

## 1 Background Information about the SignStream Project

We are pleased to be releasing SignStream® version 3.3, which has quite a few bug fixes, interface improvements, and feature enhancements. The ReadMe file included with the SignStream® distribution has further details about this update. **If you intend to use (or continue using) SignStream® going forward, it is very important that you install this version.** Files created with previous versions of SignStream® 3 will be able to be opened with this new version.

Please see <http://www.bu.edu/asllrp/SignStream/3/> for further details about the SignStream® project. We are grateful to Gregory Dimitriadis (principal SignStream developer) and Douglas Motto (supervisor) for ongoing work on the application, and to Augustine Opoku for his work in developing the Data Access Interface (DAI 2) <<http://dai.cs.rutgers.edu/dai/s/dai>> and the ASLLRP Sign Bank <<http://dai.cs.rutgers.edu/dai/s/signbank>>, which can be accessed from within SignStream®. All of this research has been carried out with support from the National Science Foundation (grants no. 1763523, 1763486, and 1763569 “CHS: Medium: Collaborative Research: Scalable Integration of Data-Driven and Model-Based Methods for Large Vocabulary Sign Recognition and Search,” to Rutgers University (Dimitris Metaxas), Boston University (Carol Neidle), and RIT (Matt Huenerfauth). We are also immensely grateful to the many ASL consultants and students who have contributed to the creation of the data sets, the annotation and verification process, and the feedback on use of the SignStream® software, and who have had a big impact on the course that the project has taken, in addition to contributing in various ways to the information contained in this document: <http://www.bu.edu/asllrp/>.

Additional documentation on the SignStream® application is available here:

- **ASLLRP Report No. 15** Neidle, C. [2017]: [A User's Guide to SignStream® 3](http://www.bu.edu/asllrp/SignStream/3/SS_User-guide.pdf)  
[http://www.bu.edu/asllrp/SignStream/3/SS\\_User-guide.pdf](http://www.bu.edu/asllrp/SignStream/3/SS_User-guide.pdf)
- **ASLLRP Report No. 16** Neidle, C. [2018]: [What's new in SignStream® 3.1.0?](http://www.bu.edu/asllrp/SignStream/3/SS_update.pdf)  
[http://www.bu.edu/asllrp/SignStream/3/SS\\_update.pdf](http://www.bu.edu/asllrp/SignStream/3/SS_update.pdf)

For further information about the annotation conventions in use by the American Sign Language Linguistic Research Project (ASLLRP), please see:

- **ASLLRP Report No. 11** Neidle, C. [2002] [SignStream™ Annotation: Conventions used for the American Sign Language Linguistic Research Project](http://www.bu.edu/asllrp/asllrpr11.pdf) <http://www.bu.edu/asllrp/asllrpr11.pdf>
- **ASLLRP Report No. 13** Neidle, C. [2018] [SignStream Annotation: Addendum to Conventions used for the American Sign Language Linguistic Research Project](http://www.bu.edu/asllrp/asllrpr13.pdf) <http://www.bu.edu/asllrp/asllrpr13.pdf>

## 2 System Requirements

This version of SignStream® will run on Mac OS 10.8 – 10.14. Java 6 (legacy) is also required; you can download that from [https://support.apple.com/kb/dl1572?locale=en\\_US](https://support.apple.com/kb/dl1572?locale=en_US).

***Important warning:*** SignStream® is not compatible with the latest version of the Mac operating system. We hope to resolve compatibility issues in the near future, but as of now, SignStream® will not work with Mac OS versions 10.15 or later.

### 3 Installation and Updating: Please read carefully

#### 3.1 If you are updating from a previous version of SignStream® (otherwise go to Section 3.2)

If you are using an earlier version of SignStream®, please **do not** invoke update option from the Help menu within the application. (The upgrade process has been modified recently.) You have two options to upgrade while preserving local files. You can either 1) download version 3.3 from the main SignStream 3 download page, and then manually copy over local files from your previous SignStream folder, as explained in Sections 3.2–3.4; *or* 2) follow the procedure below<sup>1</sup>:

While the SignStream® application is **not** running, you should do the following:

1) Download this zipfile, and take note of the folder where it downloads:

[http://dai.cs.rutgers.edu/SignStream/download/release/patches/3\\_3\\_0\\_UpgradeSignStream.zip](http://dai.cs.rutgers.edu/SignStream/download/release/patches/3_3_0_UpgradeSignStream.zip)

2) Mac OS will probably unzip the file automatically and create a folder of the same name: "**3\_3\_1\_Upgrade\_SignStream**." If not, you can unzip it by double-clicking on the zip file.

3) Within this folder are two files:

- **DisableQuarantine.command**
- **3\_3\_1\_UpgradeSignStream.command**

4) From the Finder, copy the two files directly into the top level of your existing SignStream3 folder, i.e., the folder containing the version of SignStream that you would like to update.

5) Launch "**DisableQuarantine.command**" by double-clicking (or alternatively Command-Click to get the contextual menu from which you select OPEN).

[Note: This is *different* from the [DisableQuarantine.scpt](#) that is also in that folder.]

- You may get a message asking if you want to open the file even though it is from an unidentified developer. If so, say YES.
- If you get a message that the file cannot be opened because it is from an unidentified developer:
  - a. Go into System Preferences > Security & Privacy > General
  - b. Under the section "Allow apps downloaded from" click "Open Anyway" for this file.

This will open in the Terminal application and run immediately, then close itself when finished.

6) Next, launch the **3\_3\_1\_UpgradeSignStream.command** by double-clicking (or alternatively Command-Click to get the contextual menu from which you select OPEN).

- This will also open and run in Terminal. This will launch the installation process to for version 3.3.0, going through a series of steps. Some questions (requiring a yes/no response) will be asked in the process.
- The entire installation may take up to 5 minutes or longer.
- Afterwards your renamed "SignStream3" directory is now running version 3.3.1

**You can skip ahead to Section 4.**

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<sup>1</sup> Note that this upgrade procedure may run into problems if you have QuarkXpress installed. If an error is reported, please follow the instructions in the next subsection instead.

### 3.2 If you are installing SignStream® for the first time

The application is available for download from: <http://www.bu.edu/asllrp/SignStream/3/download-newSS.html>. Unzip the "SignStream3-latest.zip" file that will have been downloaded. That will create a folder called "SignStream3". You can move the whole folder to your desired location, but do not move files out from within that folder. Before launching the application, you must complete the steps outlined in Section 3.4. You should also be sure that you have Java 6 (legacy) installed; you can download that from [https://support.apple.com/kb/dl1572?locale=en\\_US](https://support.apple.com/kb/dl1572?locale=en_US).

### 3.3 If you do a fresh install of SignStream® 3.3 but wish to manually copy local files from a prior SignStream® folder:

You should be careful to deploy the new package to a new directory distinct from your previous SignStream directory. Then copy the following files over from your old directory to the new SignStream directory (see

Figure 1) to overwrite the previous files:

- signbank/localSignBank.xml
- newXMLfiles/localAnnotators.xml
- newXMLfiles/localParticipants.xml

These directories contain information about your local annotators, participants, and Sign Bank. Copying them will ensure that you still have access to this data for use with the newest version of SignStream®. Then proceed to complete the installation as explained in Section 3.4.

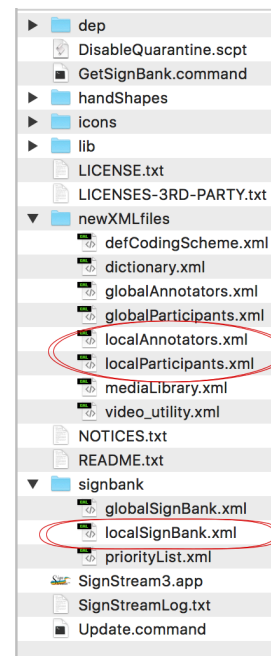


Figure 1. Local files to preserve when reinstalling SignStream®

### 3.4 Critical final steps for completing the installation or update

You **must** complete the following steps before attempting to launch the SignStream® application, by launching the appropriate files from within the SignStream® folder:

1. Launch " **DisableQuarantine.command**" by double-clicking (or alternatively Command-Click to get the contextual menu from which you select OPEN).

- You may get a message asking if you want to open the file even though it is from an unidentified developer. If so, say YES.
- If you get a message that the file cannot be opened because it is from an unidentified developer:
  - a. Go into System Preferences > Security & Privacy > General
  - b. Under the section "Allow apps downloaded from" click "Open Anyway" for this file.

This will open in the Terminal application and run immediately, then close itself when finished.

2. **If you wish to use our global Sign Bank file: Download the Sign Bank** by clicking on "GetSignBank.command" in the same folder. You will need to agree to the terms of use, after which the latest version of the GlobalSignBank file will be installed.

**It is extremely important to be using the most current version of the Sign Bank.**

New versions of the Sign Bank will be released in the future, and SignStream® will download new versions as they become available (alerting the user that this is to happen; see next section).

## 4 New Features

### 4.1 **Launching SignStream® will automatically first perform a check to update the ASLLRP Global Sign Bank file, if necessary**

When you launch SignStream®, before the application itself opens: *if* you have the ASLLRP Global Sign Bank installed, there is a check to make sure that it is up-to-date. If you have an outdated version of that Sign Bank, a terminal window will open up before the application itself launches – to enable the Sign Bank file to be updated. What you will see on your screen, in that case, is a terminal window like the one below:

```
Global Sign Bank file is currently ASLLRP
No current Boston University ASLLRP Sign Bank detected on your system.
Starting update process...
Downloading Sign Bank License...Please wait.
Done.

Terms of Use for the ASLLRP Sign Bank.

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Terms of use of the Sign Bank, which can optionally be used in conjunction with SignStream® 3:
The Global Sign Bank – and all SignStream® data files and associated video files distributed by the
ASLLRP – can be used only for research and education purposes, but cannot be redistributed without
permission. Commercial use, without explicit permission, is not allowed, nor are any patents and
copyrights based on this material. By downloading Sign Bank materials, you agree to abide by those
terms.

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Do you accept these terms of use? (Please answer yes or no)
PLEASE NOTE!!! If you answer no: your current Boston University ASLLRP Sign Bank will be deleted.
```

Figure 2. What you may see when you launch SignStream®, before the application itself opens

Once you choose *either* to update the ASLLRP Global Sign Bank file *or* to delete the outdated version you have, the application itself will then launch.

### 4.2 **New menu item to install, or uninstall, the ASLLRP Global Sign Bank**

If you have the ASLLRP Sign Bank file installed, you can *uninstall* it from the Help menu, as shown in Figure 3, if you wish to do that. A terminal window will open and you will be asked to confirm that you wish to delete the Global Sign Bank. If you proceed, the SignStream® file that is open will close; the Global Sign Bank will be removed; and then the SignStream® application will open again (you will have to manually re-open the file you were working on).

If you do *not* have the ASLLRP Global Sign Bank file installed, you can install it from the Help menu as well. If you do that, a terminal window will open, asking you to accept the terms of use. If you proceed, the SignStream® file that is open will close, and the ASLLRP Global Sign Bank file will be installed, after which SignStream® will open again (you will have to manually re-open the file you were working on).



Figure 3. Installing or uninstalling the ASLLRP Global Sign Bank from the Help menu

**4.3 Ability to annotate hand information for both right- and left-handed signers**  
*(with participant information triggering the appropriate interface choices)*

The information about the handedness of the signer is included as a property of the “participant” associated with each segment tier, as shown in Figure 4. The application now dynamically adjusts where appropriate to the current participant's handedness.

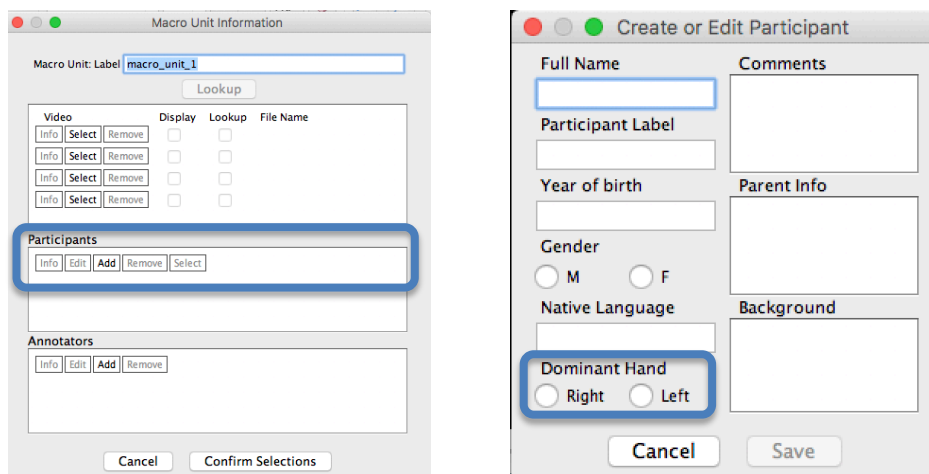
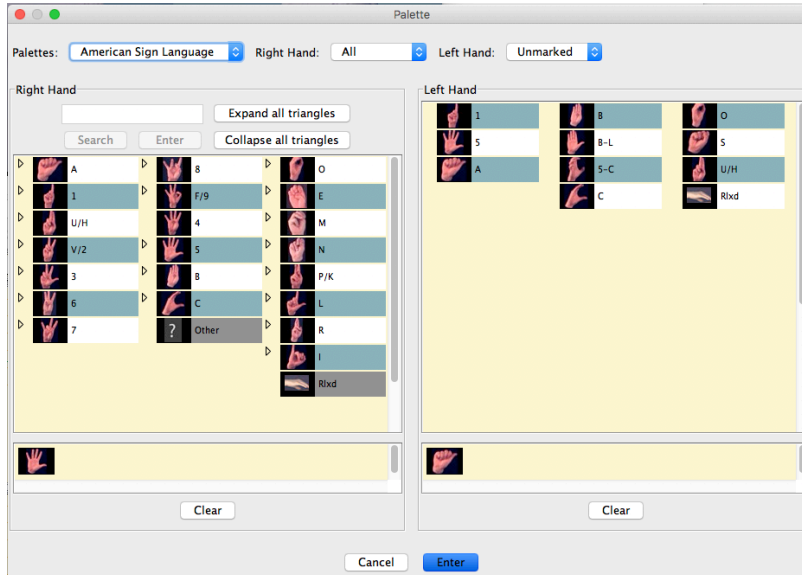


Figure 4. Information about the handedness of the signer is included with "participant" information and referenced by the program to tailor representations of hand-related information

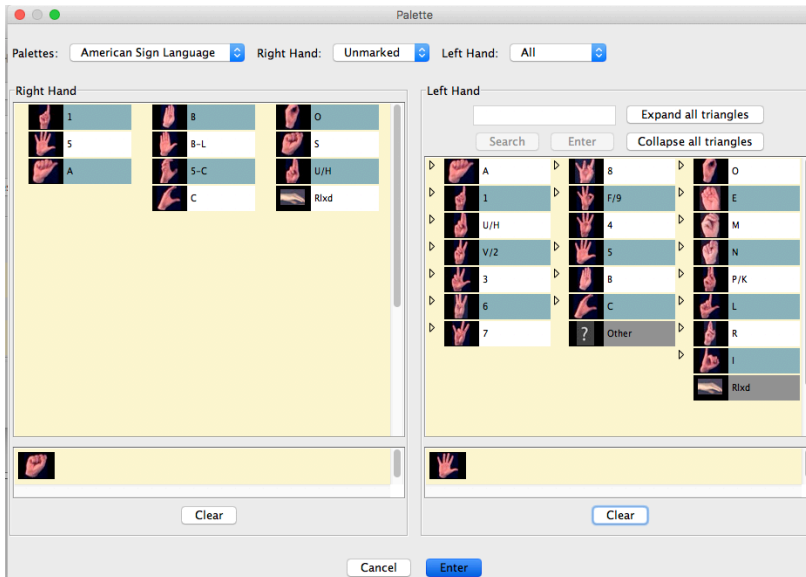
When information about what is happening on the hands is entered within the Utterance Window, the choices offered will be sensitive to the handedness of the participant. The dominant hand will be interpreted to be the right hand for right-handed signers, and conversely, it will be interpreted to be the left hand for left-handed signers. This will, for example, affect the display of the handshape palettes for two-handed signs.

For example, with a 2-handed sign that has different handshapes on the two hands, the set of options for the non-dominant hand is limited, by default, to the set of unmarked handshapes. For a right-handed signer, that would be the left hand, and vice versa for a left-handed signer.



**Figure 5. Display of handshape palettes for right-handed signer (2-handed, different handshapes)**

For a left-handed signer, this is reversed:



**Figure 6. Display of handshape palettes for left-handed signer (2-handed, different handshapes)**

In both cases, what is displayed in the Morph-Phon and Utterance Windows are the handshapes for dominant and non-dominant hands (which will be the same for left- and right-handed signers).

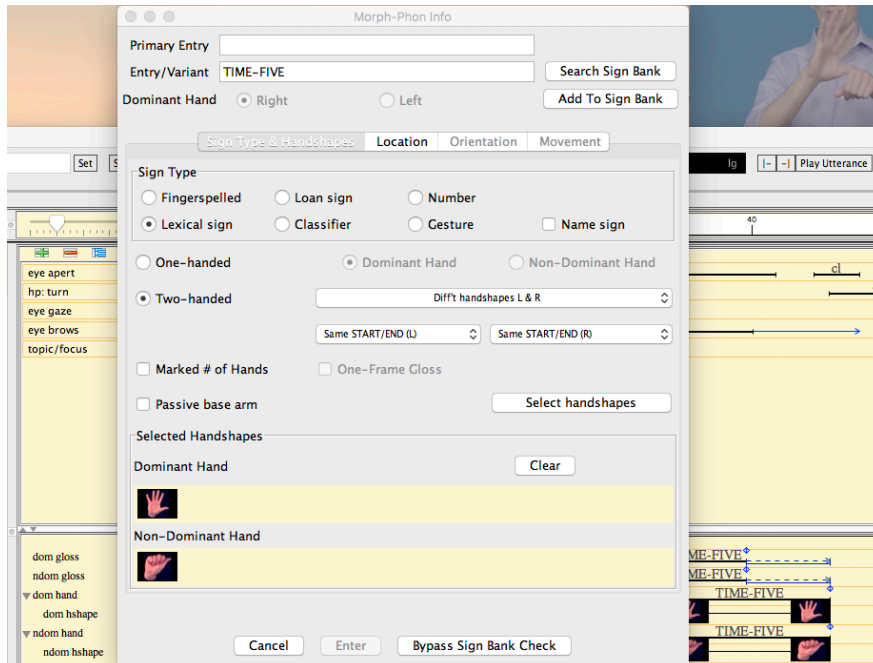


Figure 7. Handshapes as shown in the Morph-Phon Window and entered into the Utterance Window

#### 4.4 Ability to annotate location

Within the Morph-Phon window, the Location tab has been implemented for the dominant hand.

- The annotator can select start and end locations; a sole or (additional) medial location can be entered through the center of the window shown in Figure 8.

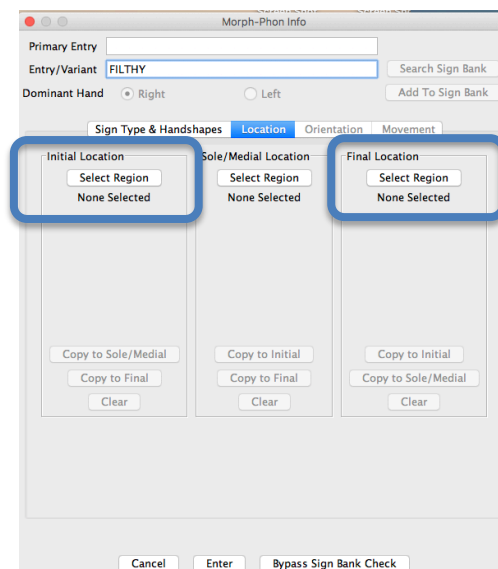


Figure 8. Location tab: for specifying start, optionally medial, and/or end locations of the dominant hand for a given sign. If there is a single location throughout the sign, it should be entered as the Sole location, in the middle



- For each position where a location is to be entered, there is a sequence of choices, with areas highlighted as the cursor rolls over them:

1. Select location for start, clicking submit at each stage:

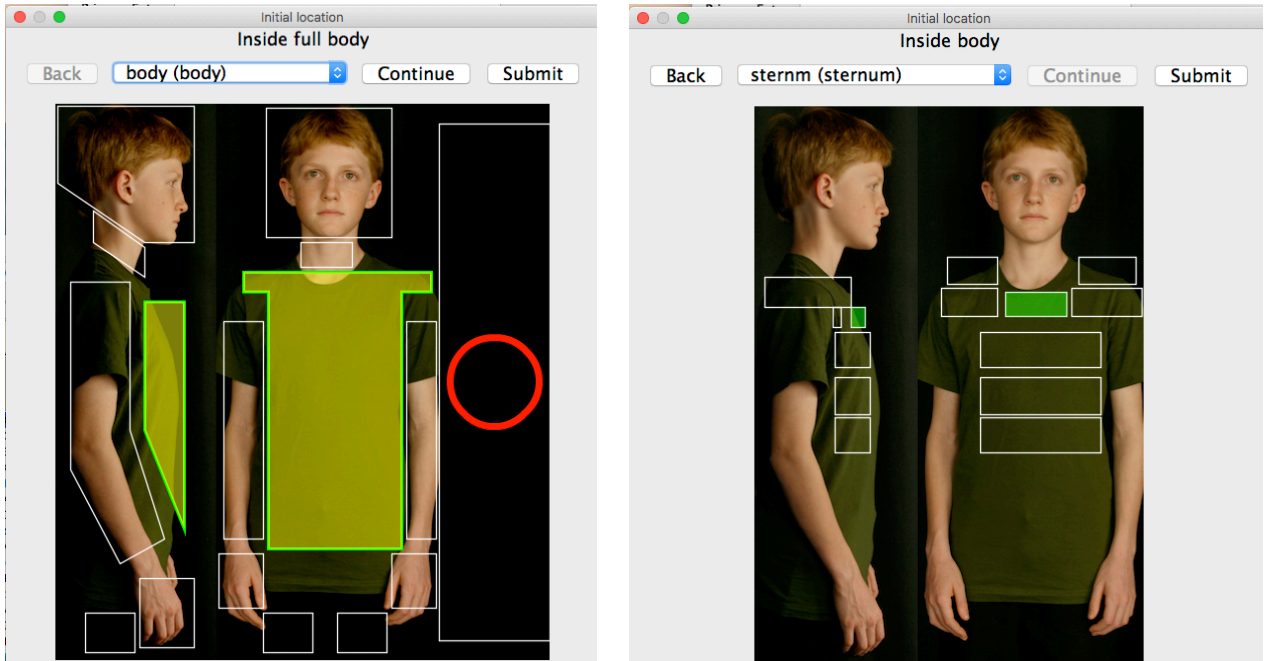


Figure 9. Having clicked on Select Region for the start location in Figure 8, you move the cursor to the general region, click Continue, and you can then select a subregion and click Submit

2. Select location for end, clicking submit at each stage:

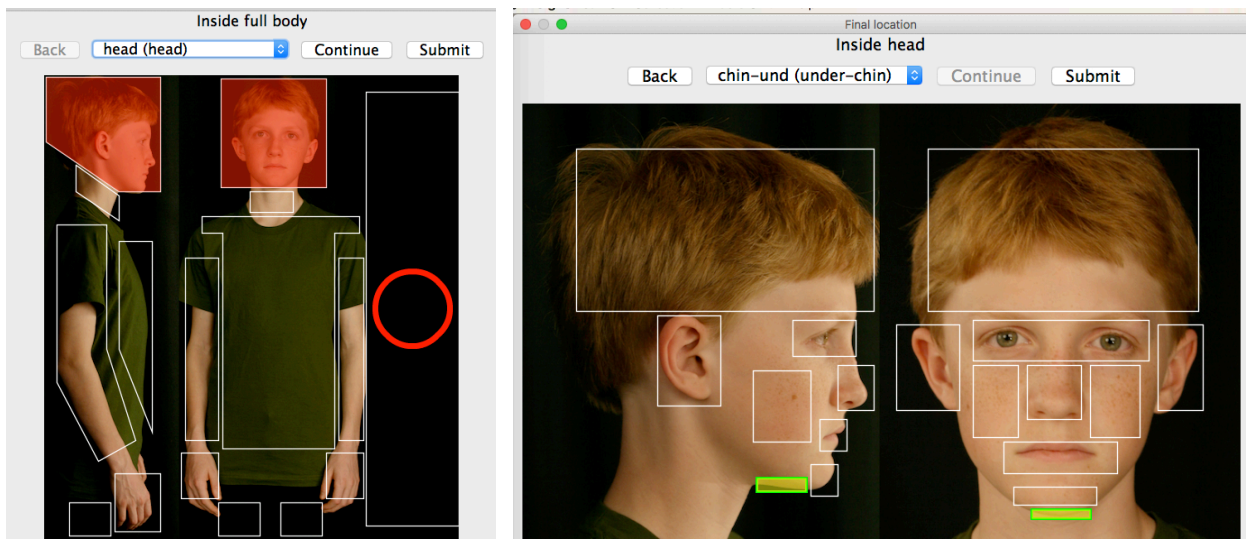


Figure 10. Having clicked on Select Region for the end location in Figure 8, you move the cursor to the general region, click Continue, and you can then select a subregion and click Submit

3. You will then see this:

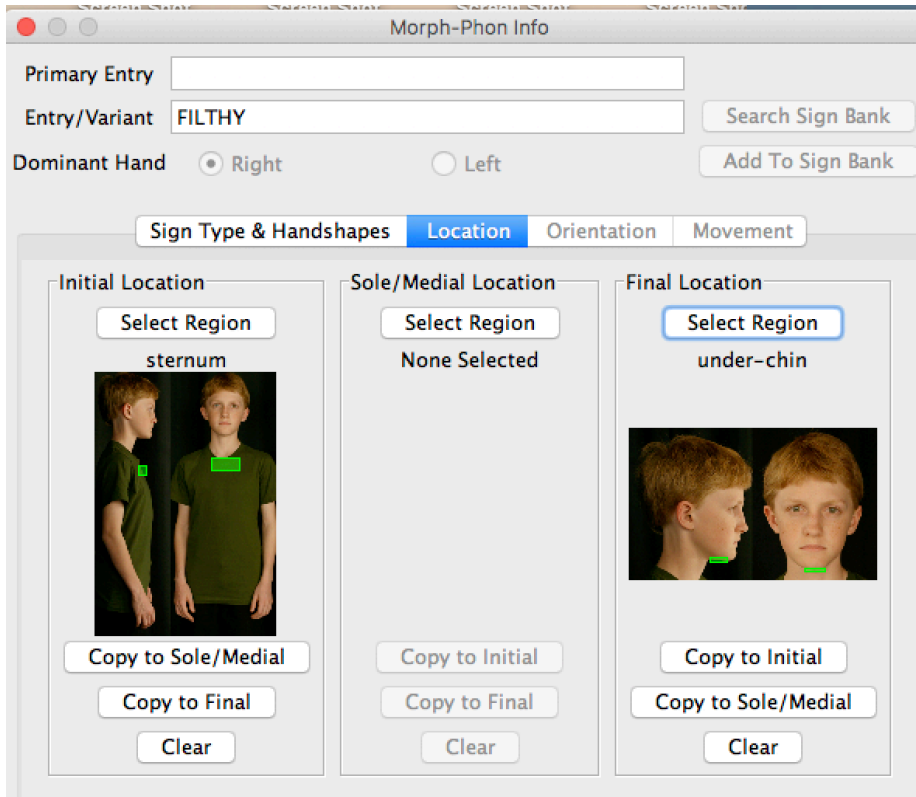


Figure 11. Submitted location information displayed in the Location Tab of the Morph-Phon Window

- The location information will be entered as text into the Utterance Window when you click on Enter (see Figure 8), appearing as follows:

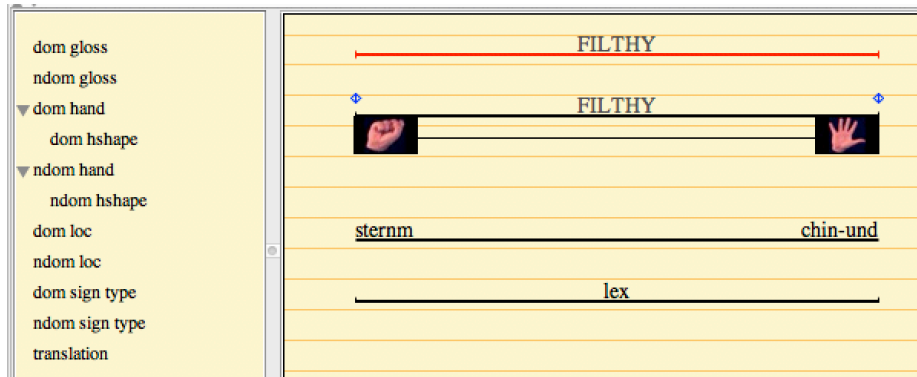


Figure 12. Location information for start and end of a sign as shown in the Utterance Window

#### 4.5 Ability to display sign type information in the Utterance Window

As shown in the above illustration, the sign type (lexical (“lex”), fingerspelled (fs), loan sign (“loan”), number (“num”), classifier (“cl”), gesture (“ges”), name sign (“ns-“ prefix to main sign type), etc.) is now visible from the Utterance Window; previously it was displayed only in the Morph-Phon window.

#### 4.6 Ability to integrate computer-generated graphical data

If there is computer-generated information for eyebrow height, eye aperture, and/or head position in 3 dimensions in the appropriate format [see Appendix], it can be associated with the collection and will then be automatically displayed (although like all other non-manual fields, these can be shown/hidden or rearranged at will).

The graph file is selected in the Macro Unit Window. Click first on “Graph” and the Graph File window will appear, enabling selection of the file to be associated with this Macro Unit.

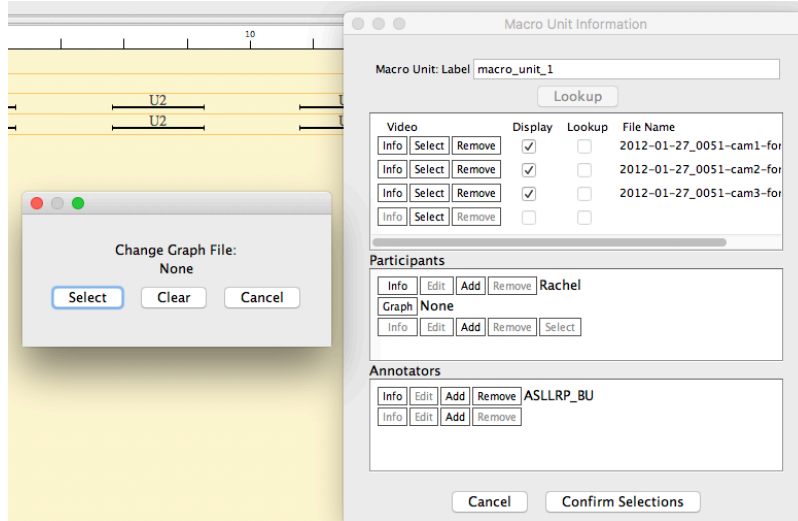


Figure 13. Selection of file with computer-generated graphical information to associate with this collection

Once associated, the selected file will be listed there.

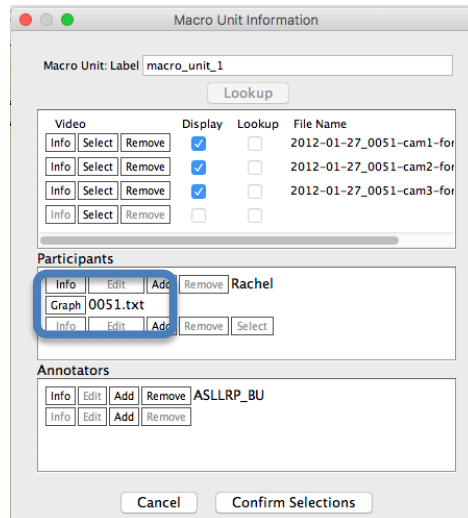


Figure 14. Display of selected file with computer-generated graphical information

Displays in the Utterance Windows will then include that information, as shown, e.g., in Figure 15.

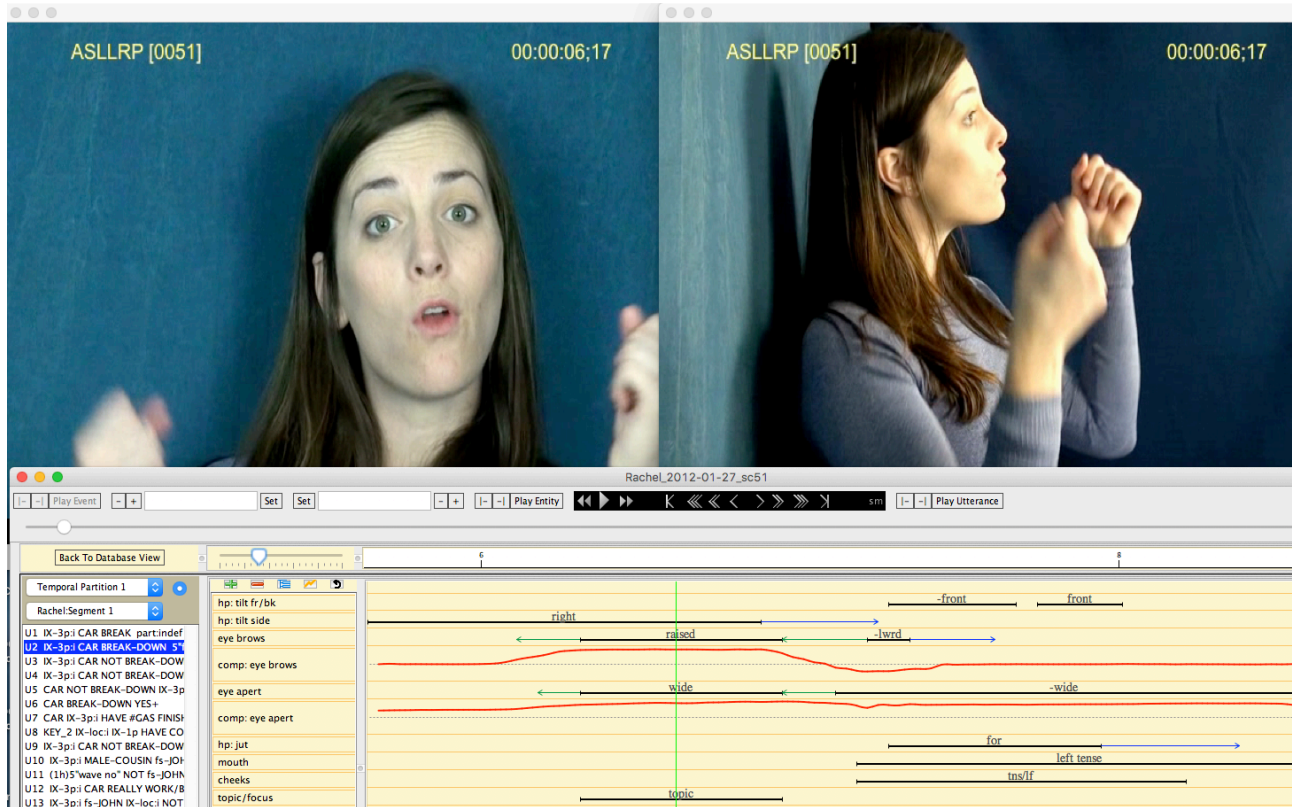


Figure 15. Display of computer-generated information (in this case, eyebrow height and eye aperture)

#### 4.6.1 Displaying/hiding fields

At the top of the list of displayed fields in Figure 15 are buttons that allow for manipulation of that display. The button on the left with the green + sign allows for selecting which fields are displayed. Fields (now including manual fields) can be displayed or hidden by checking or unchecking those boxes. The second button from the left, the red – sign, will hide whatever field is selected. The third button will display all non-empty fields (i.e., all fields containing data). The button with the yellow graph icon allows selection of graphical fields for display. Fields can be reordered by dragging them to the desired position in the display. And the last button with the black return arrow will return the display order to the default. A couple of illustrations are in Figure 16 and 17.

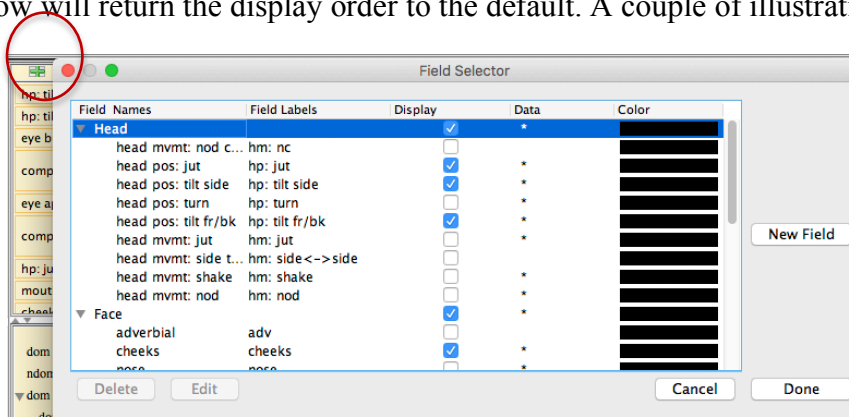


Figure 16. Selection of non-manual fields for display; invoked by clicking the highlighted button

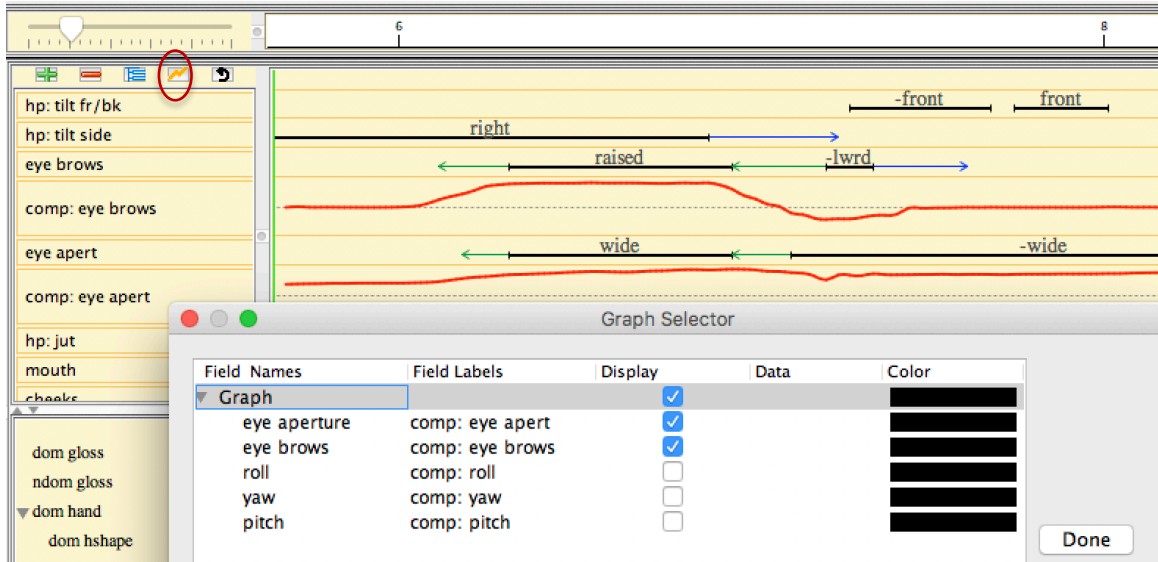


Figure 17. Window for selection of computer-generated graph fields for display, launched by clicking the highlighted button

#### 4.6.2 Adjusting the height of non-manual fields for display

Since the non-manual graphs are based on a scale of -1 to 1 (where -1 and 1 represent the largest displacements, in opposite directions, in our entire corpus), sometimes the changes that are visible are relatively small within the visible field. The user can, however, increase the width of the field, at will, by double-clicking on the name of the field, as shown below. Repeating that action will return the field to the default height.

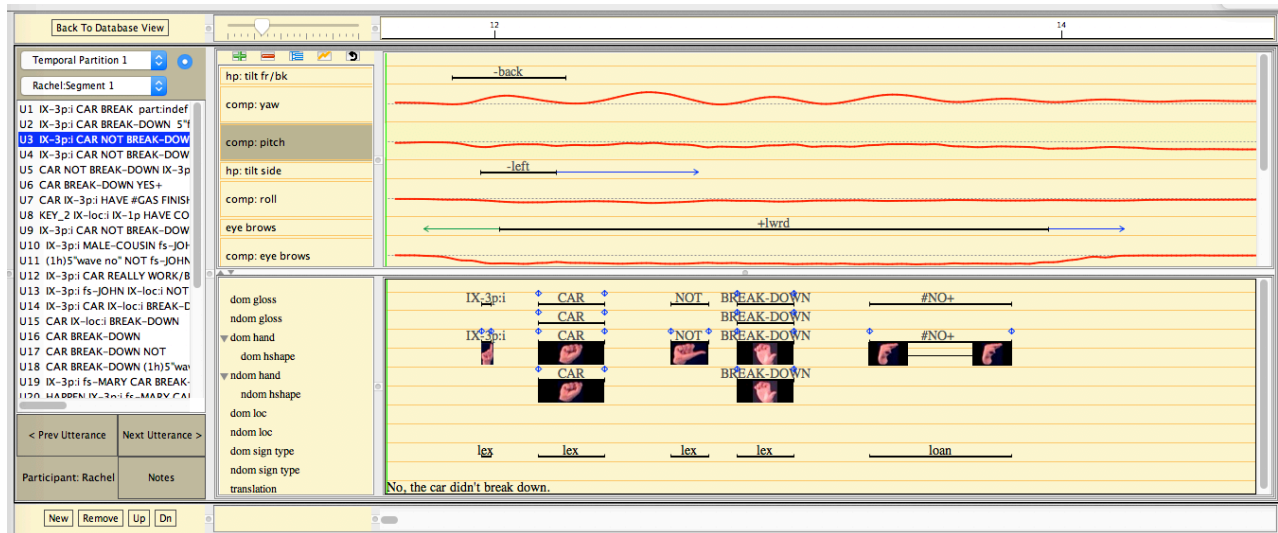


Figure 18. Display of non-manual graphical fields at default height. Compare yaw and pitch with the next figure

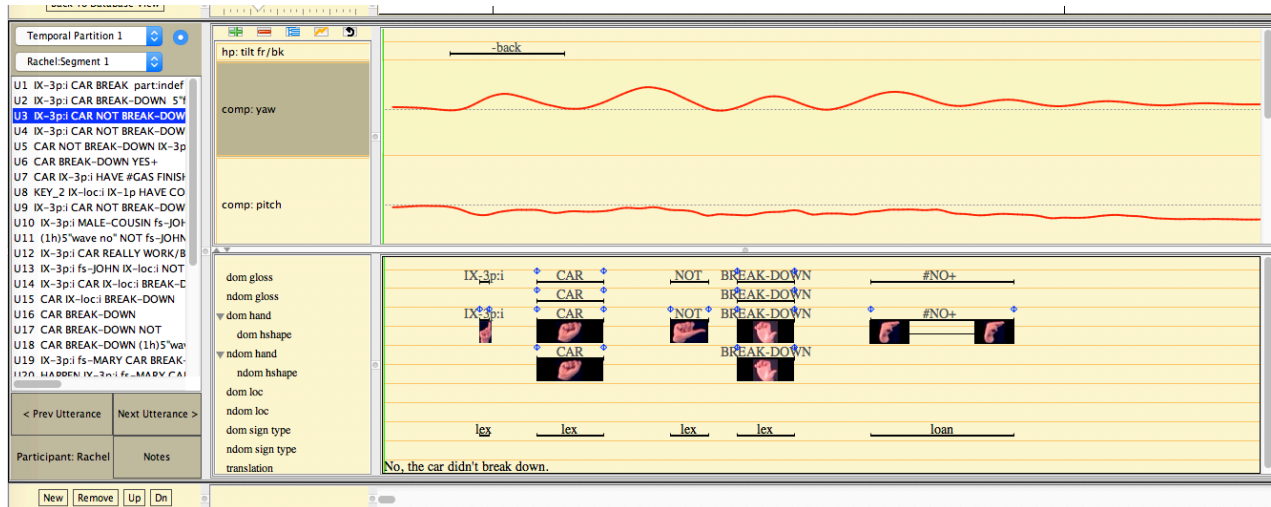


Figure 19. Display of non-manual graphical fields with increased height (resulting from double-clicking on the name of the field). Compare yaw and pitch with the previous figure

#### 4.7 Improvements to Sign Bank

The Sign Bank accessed from within SignStream® has now been expanded to allow access to both citation-form signs from our Sign Bank, and examples of specific signs from our continuous signing corpora. The Sign Bank window within SignStream® accesses our online Sign Bank, which is evolving and expanding; so you must be connected to the Internet in order to access the Sign Bank from within SignStream®. It is also essential that you have an up-to-date version of the Sign Bank file if you are using our Sign Bank from within SignStream®. If the application detects that the version of the Sign Bank you are using is out of date, it will attempt to update the file (assuming you are online at the time); you will be alerted that this is happening. Improvements have also been made to increase the speed for loading of search results.

#### 4.8 Ability to renumber utterances

By default, when new utterances are created in a Temporal Partition of the Database View, they are labelled sequentially as Utterance 1 (U1), 2 (U2), 3 (U3), and so on, as shown in Figure 20. Alternatively, it is possible to relabel the utterances to your preferred text string by clicking on the text of the label and keeping the mouse button down until the text is highlighted for editing, as shown in Figure 21.

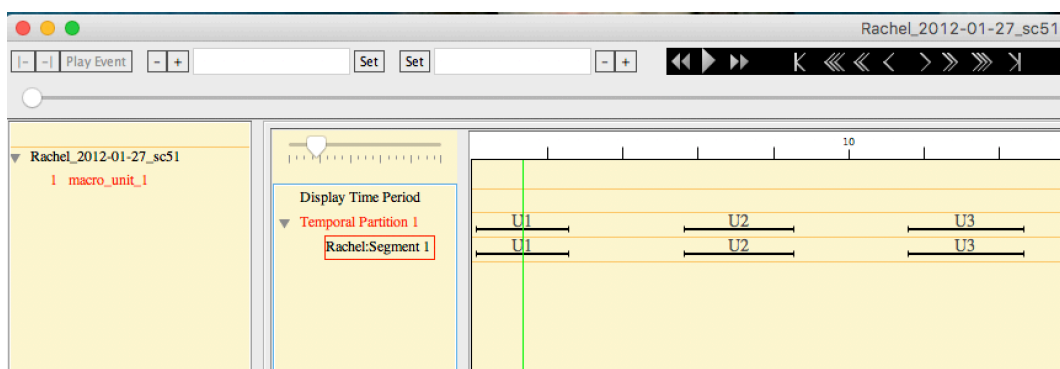
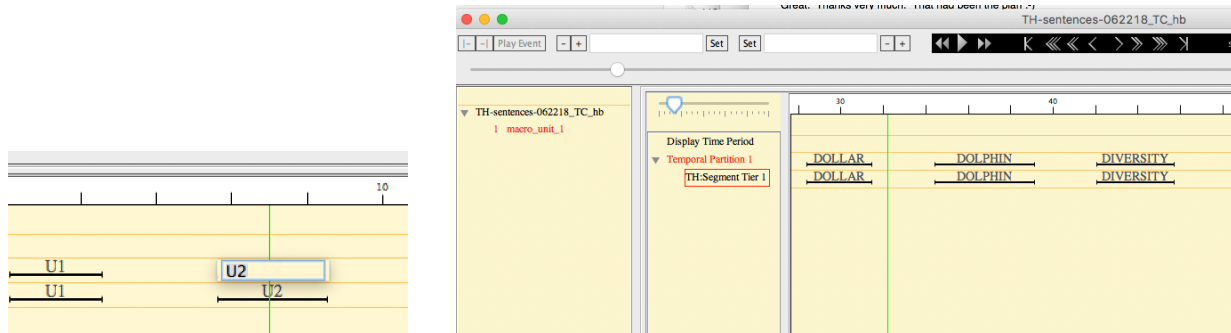
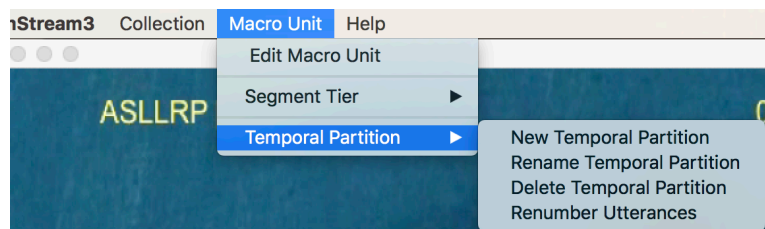


Figure 20. Utterances are automatically numbered sequentially by default, but names can be edited



**Figure 21. Utterance names can be edited**

However, it nbe the case that you delete an utterance from somewhere in that sequence and wish to renumber the remaining utterances. This is now easy to do, using the Renumber Utterances menu option:



**Figure 22. Menu option for renumbering all utterances**

However, **be warned**: this action is **not** undoable !

If you have chosen labels other than U1, U2, etc., you can also easily convert alternative labels into consecutively numbered utterances (U1, U2, U3) using this same menu command.

#### 4.9 Version tag

A version tag into every collection file, indicating the version of the application that was last used to save the file.

#### 4.10 Additional enhancements in Version 3.3

This new version incorporates many significant bug fixes (including resolution of file/folder saving issues) and enhancements to the user interface, including:

- Better ability to re-locate video files when a SignStream collection is opened on a different computer (through use of filepaths relative to the directory of the application when performing a video lookup, recursive search in those specified filepaths specified, and saving these paths to the mediaLibrary.xml file when done);
- Improvements in the search functionality from within SignStream® (which now includes the ability to search within the Translation field);
- Improvements in display (including keeping the right elements in focus in the visual field) and navigation within the Utterance Window;
- Improvements in Sign Bank load time

## **5 Additional Information: Requirements for Video File Formats**

Video codecs that work with the application; if your video is in a different format, you should first convert it to one of these:

- MPEG-4 (.mov)
- MPEG-4 (.mp4)
- H.264 (.mp4)
- AVC1 (.mp4)



## Appendix I: Format for text files with graphical information about non-manual properties

Text files of the format shown in the following example can be associated with a SignStream® collection:

```
time: 166.8333, field_id: 40001, field_name: "eye brows", field_value: -0.014
time: 166.8333, field_id: 40002, field_name: "eye aperture", field_value: 0.6276
time: 166.8333, field_id: 50001, field_name: "yaw", field_value: -0.0136
time: 166.8333, field_id: 50002, field_name: "pitch", field_value: -0.08
time: 166.8333, field_id: 50003, field_name: "roll", field_value: 0.0307
time: 200.2, field_id: 40001, field_name: "eye brows", field_value: -0.0082
```

The first five lines are for the same time; the sixth line just shows the first of the next sequence in time, and each sequence repeats for every time "chunk." Each sequence has as many lines as there are fields to graph.

- Time: actual/absolute time value in microseconds - essentially the x-value on a graph
- Field\_id: corresponds to the field id's from the defCodingSchema.xml file
- Field\_name: can be any text, and will be the string which is displayed on the utterance view when visualizations are painted
- Field\_value: the y-value to plot on the graph for this time value, normalized between (-1, 1) with 0 being equivalent to the median dotted line on the graph

## Appendix II: List of Major Fields and Values

Complete information is contained within the `defCodingScheme.xml` file in the `newXMLfiles` subfolder in the `SignStream` folder.<sup>2</sup>

### Body locations

NAME="head"	LABEL="hd"
NAME="forehead"	LABEL="fd"
NAME="ear(s)"	LABEL="er"
NAME="eye(s)"	LABEL="ey"
NAME="nose"	LABEL="ns"
NAME="cheek(s)"	LABEL="ch"
NAME="mouth"	LABEL="mth"
NAME="chin"	LABEL="chn"
NAME="neck"	LABEL="nck"
NAME="shoulder(s)"	LABEL="sh"
NAME="chest"	LABEL="chst"
NAME="abdomen"	LABEL="abd"
NAME="waist"	LABEL="wst"

### Non-manual fields

#### Group: HEAD

NAME="head pos: tilt fr/bk" LABEL="hp: tilt fr/bk"

##### Values:

NAME="front"	LABEL="front"
NAME="slightly front"	LABEL="-front"
NAME="further front"	LABEL="+front"
NAME="back"	LABEL="back"
NAME="slightly back"	LABEL="-back"
NAME="further back"	LABEL="+back"

NAME="head pos: turn" LABEL="hp: turn"

##### Values:

NAME="left"	LABEL="left"
NAME="slightly left"	LABEL="-left"
NAME="further left"	LABEL="+left"
NAME="right"	LABEL="right"
NAME="slightly right"	LABEL="-right"
NAME="further right"	LABEL="+right"

NAME="head pos: tilt side" LABEL="hp: tilt side"

##### Values:

NAME="left"	LABEL="left"
NAME="slightly left"	LABEL="-left"
NAME="further left"	LABEL="+left"
NAME="right"	LABEL="right"
NAME="slightly right"	LABEL="-right"
NAME="further right"	LABEL="+right"

---

<sup>2</sup> The `defCodingScheme.xml` contains a larger list, including field and value labels for features that have not yet been implemented or that are no longer in use. Those in this list that appear in menus but that we no longer use productively are grayed out here.

NAME="head pos: jut" LABEL="hp: jut"

Values:

NAME="forward"	LABEL="for"
NAME="slightly forward"	LABEL="-for"
NAME="further forward"	LABEL="+for"
NAME="back"	LABEL="back"
NAME="slightly back"	LABEL="-back"
NAME="further back"	LABEL="+back"

NAME="head mvmt: nod" LABEL="hm: nod"

Values:

NAME="rapid"	LABEL="rapid"
NAME="slight rapid head nod"	LABEL="-rapid"
NAME="slow"	LABEL="slow"
NAME="slight slow head nod"	LABEL="-slow"
NAME="single"	LABEL="single"
NAME="slight single head nod"	LABEL="-single"

NAME="head mvmt: nod cycles" LABEL="hm: nc"

Values:

NAME="minimum"	LABEL="0"
NAME="maximum"	LABEL="1"

NAME="head mvmt: shake" LABEL="hm: shake"

Values:

NAME="rapid"	LABEL="rapid"
NAME="slight rapid head shake"	LABEL="-rapid"
NAME="slow"	LABEL="slow"
NAME="slight slow head shake"	LABEL="-slow"
NAME="single"	LABEL="single"
NAME="slight single head shake"	LABEL="-single"

NAME="head mvmt: side to side" LABEL="hm: side<-&gt;side"

Values:

NAME="rapid"	LABEL="rapid"
NAME="slow"	LABEL="slow"
NAME="single"	LABEL="single"

NAME="head mvmt: jut" LABEL="hm: jut"

Values:

NAME="slow"	LABEL="slow"
NAME="forward"	LABEL="for"
NAME="back"	LABEL="back"
NAME="slightly back"	LABEL="-back"
NAME="left"	LABEL="left"

**Group: BODY**

**NAME="body lean"**

**LABEL="body lean"**

**Values:**

NAME="left"	LABEL="left"
NAME="right"	LABEL="right"
NAME="forward"	LABEL="for"
NAME="slightly forward"	LABEL="-for"
NAME="forward/left"	LABEL="for/lf"
NAME="forward/right"	LABEL="for/rt"
NAME="back"	LABEL="back"
NAME="slightly back"	LABEL="-back"
NAME="back/left"	LABEL="bk/lf"
NAME="back/right"	LABEL="bk/rt"
NAME="slightly right"	LABEL="-right"

**NAME="shoulders"**

**LABEL="shoulders"**

**Values:**

NAME="left"	LABEL="left"
NAME="slightly left"	LABEL="-left"
NAME="left/down"	LABEL="lf/dn"
NAME="left/raised"	LABEL="lf/raised"
NAME="right"	LABEL="right"
NAME="slightly right"	LABEL="-right"
NAME="right/down"	LABEL="rt/dn"
NAME="right/raised"	LABEL="rt/raised"
NAME="down"	LABEL="down"
NAME="raised"	LABEL="raised"
NAME="further raised"	LABEL="+raised"
NAME="forward"	LABEL="for"
NAME="forward/left"	LABEL="for/lf"
NAME="forward/right"	LABEL="for/rt"
NAME="back"	LABEL="back"
NAME="back/left"	LABEL="bk/lf"
NAME="back/right"	LABEL="bk/rt"
NAME="shrug"	LABEL="shrug"
NAME="left/shrug"	LABEL="lf/shrug"
NAME="right/shrug"	LABEL="rt/shrug"
NAME="slightly raised"	LABEL="-raised"

**Group: FACE**

**NAME="eye brows"**

**LABEL="eye brows"**

**Values:**

NAME="raised"	LABEL="raised"
NAME="slightly raised"	LABEL="-raised"
NAME="further raised"	LABEL="+raised"
NAME="lowered"	LABEL="lwrd"
NAME="slightly lowered"	LABEL="-lwrd"
NAME="further lowered"	LABEL="+lwrd"
NAME="raised-furrowed"	LABEL="raised-furrowed"
NAME="right raised/left furrowed"	LABEL="rt raised/lf furrowed"

NAME="eye gaze"

LABEL="eye gaze"

Values:

NAME="up"  
NAME="up/right"  
NAME="down/left"  
NAME="down"  
NAME="left"  
NAME="watch hands"  
NAME="down/right"  
NAME="up/left"  
NAME="to addressee"  
NAME="into space"

LABEL="up"  
LABEL="up/rt"  
LABEL="dn/lf"  
LABEL="down"  
LABEL="left"  
LABEL="track-hd"  
LABEL="dn/rt"  
LABEL="up/lf"  
LABEL="adreesee"  
LABEL="sp"

NAME="eye aperture"

LABEL="eye apert"

Values:

NAME="blink"  
NAME="squint"  
NAME="wide"  
NAME="lowered lid"  
NAME="closed"  
NAME="slightly lowered"  
NAME="further lowered"  
NAME="slightly squinted"  
NAME="further squinted"  
NAME="wider"  
NAME="slightly wide"

LABEL="bl"  
LABEL="sq"  
LABEL="wide"  
LABEL="low"  
LABEL="cl"  
LABEL="-low"  
LABEL="+low"  
LABEL="-sq"  
LABEL="+sq"  
LABEL="+wide"  
LABEL="-wide"

NAME="nose"

LABEL="nose"

Values:

NAME="wrinkle"  
NAME="tensed"  
NAME="slightly tensed"  
NAME="further tensed"  
NAME="wrinkle left"  
NAME="wrinkle right"

LABEL="wr"  
LABEL="tns"  
LABEL="-tns"  
LABEL="+tns"  
LABEL="wrinkle/lf"  
LABEL="wrinkle/rt"

NAME="mouth"

LABEL="mouth"

Values:

NAME="lips pursed: oo"  
NAME="lips pursed: oo-tight"  
NAME="lips pursed: mm"  
NAME="lips pursed corners down"  
NAME="tongue out"  
NAME="tongue sucked in quickly"  
NAME="tongue mvmt lateral"  
NAME="cha"  
NAME="sta"  
NAME="puh"  
NAME="pow"  
NAME="sh"  
NAME="cs"  
NAME="intense"  
NAME="open"  
NAME="open & round"  
NAME="open & tense"  
NAME="open & corners down"  
NAME="raised upper lip"

LABEL="oo"  
LABEL="oo-tight"  
LABEL="mm"  
LABEL="lp/cd"  
LABEL="th"  
LABEL="thp"  
LABEL="tml"  
LABEL="cha"  
LABEL="sta"  
LABEL="puh"  
LABEL="pow"  
LABEL="sh"  
LABEL="cs"  
LABEL="int"  
LABEL="open"  
LABEL="open/rd"  
LABEL="open/tns"  
LABEL="open/cd"  
LABEL="rul"

NAME="lips spread"	LABEL="ls"
NAME="lips spread & crnrs up"	LABEL="ls/cu"
NAME="lips spread & crnrs down"	LABEL="ls/cd"
NAME="blow"	LABEL="bl"
NAME="bite lower lip"	LABEL="bll"
NAME="tongue on lwr lip"	LABEL="toll"
NAME="open & tongue visible"	LABEL="otv"
NAME="brr"	LABEL="brr"
NAME="smile mouth open"	LABEL="open-smile"
NAME="right tense"	LABEL="right tense"

NAME="cheeks" LABEL="cheeks"

Values:

NAME="puffed"	LABEL="puf"
NAME="puff left"	LABEL="puf/lf"
NAME="puff right"	LABEL="puf/rt"
NAME="tensed"	LABEL="tns"
NAME="less tensed"	LABEL="-tns"
NAME="tensed left"	LABEL="tns/lf"
NAME="tensed right"	LABEL="tns/rt"
NAME="more tensed"	LABEL="+tns"

Group: GRAMMATICAL

NAME="negative" LABEL="negative"

Values:

NAME="negation"	LABEL="neg"
-----------------	-------------

NAME="wh question" LABEL="wh question"

Values:

NAME="whq"	LABEL="q/wh"
------------	--------------

NAME="yes-no question" LABEL="yes-no question"

Values:

NAME="yes-no question"	LABEL="q/y-n"
------------------------	---------------

NAME="rhetorical question" LABEL="rhq"

Values:

NAME="rhq"	LABEL="rhq"
NAME="wh rhq"	LABEL="rhq/wh"
NAME="yes-no rhq"	LABEL="rhq/y-n"
NAME="rhq2"	LABEL="rhq2"

NAME="topic/focus" LABEL="topic/focus"

Values:

NAME="focus/top1"	LABEL="foc/top1"
NAME="top2"	LABEL="top2"
NAME="top3"	LABEL="top3"
NAME="foc/prop-with-ref-to"	LABEL="foc/ref"
NAME="sentence-initial adverb"	LABEL="foc/adv"
NAME="focus"	LABEL="focus"
NAME="topic"	LABEL="topic"

NAME="conditional/when" LABEL="cond/when"

Values:

NAME="conditional"	LABEL="cond"
NAME="when"	LABEL="when"

NAME="role shift" LABEL="role shift" PREFIX="rs"

Values:

NAME="rs:other"	LABEL="rs:other"
-----------------	------------------

NAME="adverbial" LABEL="adv"

Values:

NAME="far"	LABEL="far"
NAME="cs"	LABEL="cs"
NAME="stress"	LABEL="stress"
NAME="mm"	LABEL="mm"
NAME="oo"	LABEL="oo"
NAME="cha"	LABEL="cha"

## Non-manual coding conventions and further descriptions/explanations

including conventions for identifying the onset and offset of different types of non-manual anatomical events

### Head

- **head mvmt: nod cycle:** Head executes a series of juttred nods. From side view, head makes a circular movement.
  - Onset: movement from neutral to front/back
  - Event: entire nod movement
  - Offset: N/A
- **head pos: jut:** Head moves straight forward or backward from the neck, typically lead by the chin.
  - Onset: N/A
  - Event: movement from neutral to maximal front/back position
  - Offset: movement from maximal front/back position to neutral
- **head pos: tilt side:** Head leans from vertical toward left or right shoulder.
  - Onset: N/A
  - Event: movement from neutral to maximal left/right position
  - Offset: movement from maximal left/right position to neutral
- **head pos: turn:** Head turns from looking straight ahead to facing more towards left or right of signer.
  - Onset: N/A
  - Event: movement from neutral to maximal left/right position
  - Offset: movement from maximal left/right position to neutral

- **head pos: tilt fr/bk:** Head tips front or back from vertical, typically lead by forehead.
  - Onset: N/A
  - Event: movement from neutral to maximal front/back position
  - Offset: movement from maximal front/back position to neutral
- **head mvmt: jut:** Movement of head into a juttred position.
  - No longer used. Movement from neutral is now accounted for in head pos: jut
- **head mvmt: side to side:** Head moves left to right from the neck. Head moves alternatingly towards each shoulder while remaining upright, chin parallel to the floor, without turning or tilting. This is a rare marking.
  - Onset: N/A
  - Event: entire movement from side to side
  - Offset: N/A
- **head mvmt: shake:** Head repeatedly turns side to side.
  - Onset: Initial turn from neutral to left or right
  - Event: entire back and forth shaking movement
  - Offset: N/A
- **head mvmt: nod:** Head repeatedly tilts front and back.
  - Onset: movement from neutral to front/back
  - Event: entire nod movement
  - Offset: N/A

## Face

- **cheeks**
  - Onset: N/A
  - Event: entire time cheeks are moving from neutral or are in marked position
  - Offset: N/A
- **nose**
  - Onset: N/A
  - Event: change from neutral to non-neutral state and entire time nose is in non-neutral state
  - Offset: change back to neutral
- **mouth**
  - Onset: N/A
  - Event: entire time mouth is fully in marked position
  - Offset: N/A
- **eye gaze**
  - Onset: N/A
  - Event: entire time signer is not looking directly at front view camera
  - Offset: N/A



- **eye aperture**
  - squint: Eyelids lowered with tension. Can be identified by wrinkles under and around eyes.
    - Onset: movement from neutral to fully squinted position\*
    - Event: duration of squint
    - Offset: return from fully squinted position back to neutral\*
    - \*If squint is immediately preceding or following a blink or closed eye event, it may not require on/offset
  - blink: Eyes closed for 4 or fewer frames
    - Onset: N/A
    - Event: duration of blink when eyes are fully closed
    - Offset: N/A
  - closed: Eyes closed for more than 4 frames
    - Onset: N/A
    - Event: entire time eyes are fully closed
    - Offset: N/A
  - lowered: Eyelids lowered without tension
    - Onset: movement from neutral to lowest position for that occurrence\*
    - Event: duration lids are held at that position
    - Offset: movement from lowest position back to neutral\*
    - \*If lowered event is immediately preceding or following a blink or closed eye event, it may not require on/offset
  - wide: Eyelids raised
    - Onset: movement from neutral to widest position for that occurrence\*
    - Event: duration eyes are held at that width
    - Offset: movement from widest position back to neutral
    - \*If wide event is immediately preceding or following a blink or closed eye event, it may not require on/offset
- **eye brows**
  - raised
    - Onset: movement from neutral to maximal height for that occurrence
    - Event: duration eyebrows held in that position
    - Offset: movement from maximal height back to neutral
  - lowered
    - Onset: movement from neutral to lowest position for that occurrence
    - Event: duration eyebrows held in that position
    - Offset: movement from lowest position back to neutral
  - raised-furrowed: Eyebrows are raised and drawn together.
    - Onset: movement from neutral to maximal position for that occurrence
    - Event: duration eyebrows held in that position
    - Offset: movement from maximal position back to neutral

## Body

- **neck**
  - Onset: movement from neutral to marked position
  - Event: entire time neck is fully in marked position
  - Offset: movement from marked position back to neutral
- **role shift**: Signer takes on the role of another person or entity in a story by shifting shoulders to a new position in signing space.
  - Onset: N/A
  - Event: body movement from neutral or one side to other side and entire time body is in this secondary position
  - Offset: N/A
- **body mvmt**
  - Onset: N/A
  - Event: movement of body from neutral position to lowered position and entire time body is lowered
  - Offset: movement from lowered position back to neutral
- **shoulders**
  - Onset: movement from neutral to maximal marked position
  - Event: entire time shoulders are in maximal marked position
  - Offset: movement from maximal marked position back to neutral
- **body lean**
  - Onset: movement from neutral to maximal lean
  - Event: entire time body is in maximal lean
  - Offset: return from maximal lean to neutral

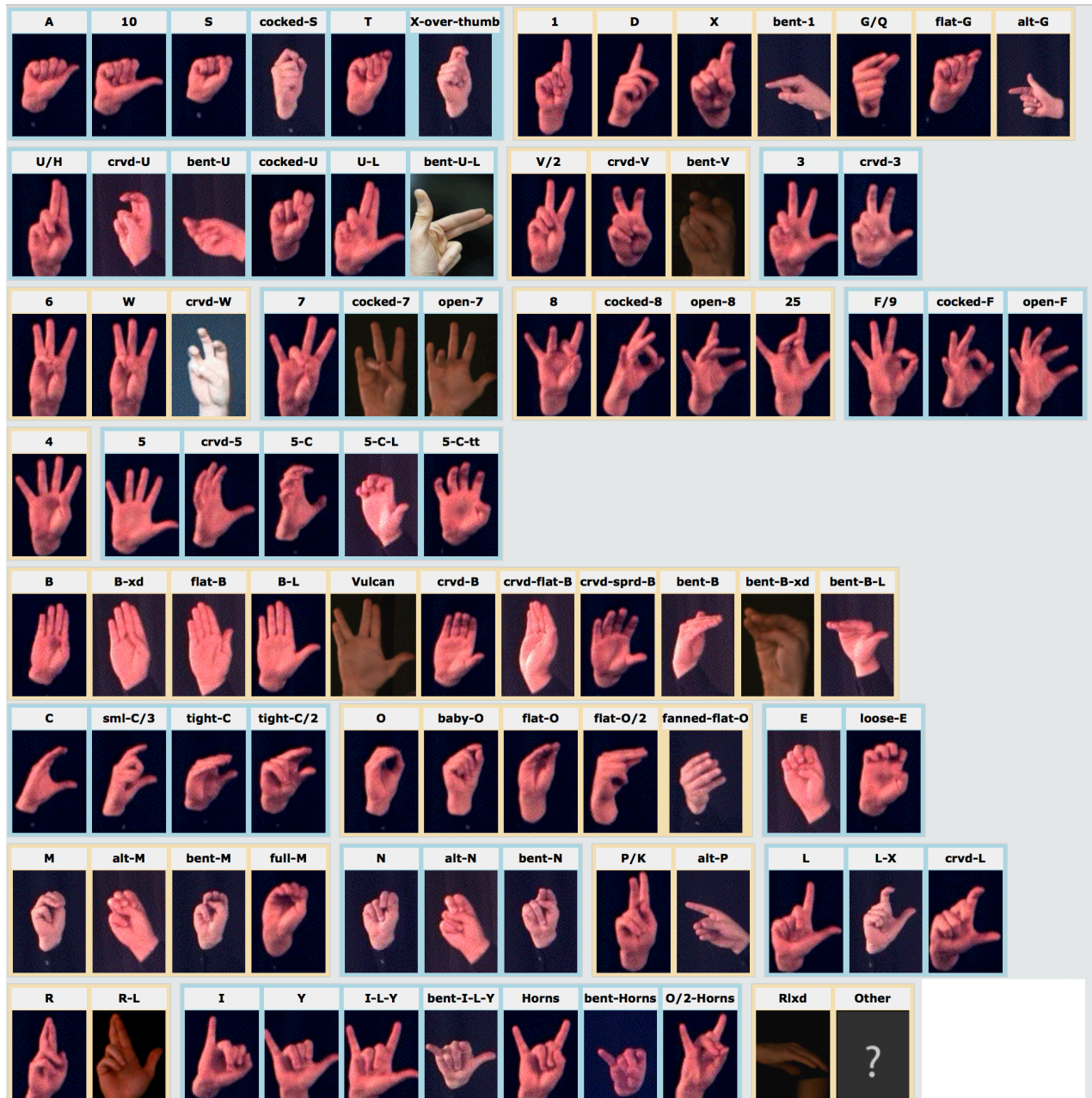
## Grammatical (Note: Grammatical markings do not have onsets or offsets)

- **relative clause** or correlative: generally clause-initial in ASL, a clause that specifies information about a noun phrase in the main clause. Characterized by raised eyebrows and sometimes a nose wrinkle marking specificity.
- **rhetorical question**: Question asked and then immediately answered by signer without expectation of response from interlocutor.
  - rhq: Marked with raised eyebrows.
  - rhq2: A rhetorical question, but very similar in appearance to a regular wh-question (with lowered brows)
  - wh rhq: Distinction was once made, but has been collapsed into “rhq”
  - yes-no rhq: Distinction was once made, but since, has been collapsed into “rhq”

- **wh question:** Question phrase using *who, what, when, where, why, or how*. Nonmanual event aligns with entire question, indicated by lowered eyebrows and often a head tilt or jut, sometimes a rapid headshake over the wh-phrase; generally more intense toward the end of the question. Nonmanual event endpoints may not align exactly with main glosses of the wh-question clause.
- **yes-no question:** Question that requires a yes or no answer (i.e., *Did you see that movie?*). Marked with raised eyebrows and often a head tilt or jut. Nonmanual event endpoints may not align exactly with main glosses of yes-no question clause.
- **negative:** Generally somewhat furrowed brows and reduction in eye aperture, and/or headshake. Nonmanual event generally aligns with entire negated phrase.
- **conditional/when:** Conditional of “if” clause, e.g., *If it’s raining*, I will bring my umbrella. When: *When it’s raining*, I bring my umbrella). Nonmanual event aligns with entire conditional or when clause, italicized in examples above.
- **topic/focus:**
  - topic: noun phrase at beginning of a clause that identifies a (base-generated) topic or contrastive focus (as a result of syntactic movement). Characterized most prominently by raised eyebrows. (e.g., *Tomatoes* Mary hates).
  - focus: Emphasized noun or noun phrase acting occurring within an utterance (but not at the left periphery of the clause.) Characterized most prominently by raised eyebrows. (e.g., I bought a *book*, not a wallet).
  - sentence-initial adverbial: Adverbial sign used at beginning of sentence (i.e., *tomorrow* I will leave). Nonmanual event aligns with main gloss of adverbial phrase.
  - focus/top1: Distinction was once made, but has been collapsed into “topic”
  - top2: Distinction was once made, but has been collapsed into “topic”
  - top3: Signified by rapid head nod (e.g., (You know) *John?* He’s my cousin).

## Appendix III: Handshape Names and Labels

See also <http://www.bu.edu/asllrp/csigr/pages/ncslgr-handshapes.html>, which provides access to videos with the handshapes viewed from multiple angles.



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