American Sign Language

Linguistic Research Project

A Guide to the ASLLRP Sign Bank – New Search Features

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The **ASLLRP Sign Bank** allows browsing, search, and download of collections of signs and utterances.

1.   DATA ACCESS INTERFACE: CONTINUOUS SIGNING DATA (UTTERANCES) -- https://dai.cs.rutgers.edu/dai/s/dai

Our high-quality videos (multiple views, including face close-ups) of linguistically annotated[1] ASL sentences can be searched and viewed in various ways. The **sign** search interface is shown in Figure 1, with example search results shown in Figure 2. Searches can also be conducted based on **utterance-level properties**, as shown in Figure 3 (which extends over pages 2 and 3). All of these searches can also be restricted by collection and/or signers ("participants").

Figure 1. Sign Search - in SignStream® Collections

Partial Results of Search for Signs with Glosses Containing the Characters "stop"

Search - ASLLRP Linguistic Annotations and Video Files

stop   🔍 SUBMIT

○ Whole ● Partial

Hand   ○ Dominant ○ Non-Dominant ● Don't Care

Query Results: Sign Summary

[Expand all](#)

Sign ▲▼	Occurrences ▲▼	Ben	Cory	Jonathan	Rachel
(1h)STOP	1	1	0	0	0
STOP	11	1	1	1	8
STOPLIGHT	1	0	1	0	0

☐ Rachel_2012-02-14_sc63-U-9

📄 Gloss..
Sign: 🧍🔵🧍
Utterance: 🧍🔵🧍

```
topic/focus:                        __foc/adv_
        dh: MAYBE   TOMORROW RAIN   FINISH  STOP
  dh shape:
       ndh: MAYBE_          RAIN    FINISH  STOP
 ndh shape:
engl trans: Maybe tomorrow it will stop raining.
```

☐ Rachel_2012-02-14_sc63-U-10

📄 Gloss..
Sign: 🧍🔵🧍
Utterance: 🧍🔵🧍

```
cond/when: _____cond___
        dh: IF     TOMORROW RAIN    STOP    IX-1p   DEPART
  dh shape:
       ndh:                 RAIN    STOP
 ndh shape:
engl trans: If it stops raining tomorrow, I will leave.
```

☐ Rachel_2012-02-09_sc61-U-30

📄 Gloss..
Sign: 🧍🔵🧍
Utterance: 🧍🔵🧍

```
cond/when: _____cond____
        dh: GO-OUT SNOW+   STOP     SCHOOL  FUTURE fs-RE +OPEN      TOMORROW
  dh shape:
       ndh:        SNOW+   STOP     SCHOOL          OPEN
 ndh shape:
engl trans: If it stops snowing outside then school will reopen tomorrow.
```

☐ Rachel_2012-02-09_sc60-U-5

📄 Gloss..
Sign: 🧍🔵🧍
Utterance: 🧍🔵🧍

```
negative: _____neg__
        dh: ns-fs-MARY  NOT    STOP    ROWING  #NO+
  dh shape:
       ndh:                    STOP    ROWING
 ndh shape:
engl trans: No, Mary didn't stop rowing.
```

Sign video for Rachel_2012-02-09_sc60 U:5 Sign=stop View=Side ✕

ASLLRP [0060]   00:00:18;25

▶ 0:00 / 0:00   🔊 ⛶ ⋮

Figure 2. Example of Sign Search Results – Multiple views of Signs and Utterances can be played.

ASLLRP Continuous Signing Corpora

Utterance Search

🔍 **SUBMIT**

Limit to (Limit the search results to the following options)

☐ ➕ Grammatical Construction (3413)
  ☐ negative (595)
  ☐ wh question (328)
  ☐ yes-no question (254)
  ☐ ➕ rhetorical question (274)
    ☐ rhq (238) ☐ rhq2 (36)
  ☐ ➕ topic/focus (1370)
    ☐ foc/prop-with-ref-to (23) ☐ sentence-initial adverb (156)
    ☐ focus (245) ☐ topic (946)
  ☐ ➕ conditional/when (469)
    ☐ conditional (300) ☐ when (169)
  ☐ ➕ role shift (79)
    ☐ other (14) ☐ other (2) ☐ Deaf (12) ☐ other2 (1) ☐ mother (4) ☐ role shift other person (21) ☐ parents (1)
    ☐ hearing person (3) ☐ CODA (1) ☐ narrator (4) ☐ proctor (2) ☐ student (2)
    ☐ teacher (2) ☐ woman (2) ☐ hearing person (2) ☐ CODA (2) ☐ friend (2) ☐ narrator (1)
      ☐ relative clause (44)

And (Combine grammatical construction or non-manual markings)

☐ ➕ Non-manual Markings (32283)

  ☐ ➕ Head Position (9617)
    ☐ ➕ head pos: tilt fr/bk (2839)
      ☐ further back (69) ☐ front (653) ☐ back (645) ☐ slightly back (852) ☐ slightly front (557)
      ☐ further front (63)
    ☐ ➕ head pos: turn (2014)
      ☐ left (440) ☐ right (448) ☐ slightly right (471) ☐ slightly left (581) ☐ further right (43)
      ☐ further left (31)
    ☐ ➕ head pos: tilt side (3238)
      ☐ left (470) ☐ right (662) ☐ slightly right (1249) ☐ head dip left (2) ☐ slightly left (745)
      ☐ further right (33) ☐ further left (77)
    ☐ ➕ head pos: jut (1526)
      ☐ slightly back (260) ☐ further back (13) ☐ forward (640) ☐ back (160) ☐ further forward (42)
      ☐ slightly forward (411)

  ☐ ➕ Head Movement (2856)
    ☐ ➕ head mvmt: nod (1085)
      ☐ slight slow head nod (42) ☐ slight single head nod (129)
      ☐ rapid (203) ☐ slow (136) ☐ single (305) ☐ slight rapid head nod (270)
    ☐ ➕ head mvmt: nod cycles (1)
      ☐ maximum (1)
    ☐ ➕ head mvmt: shake (1204)
      ☐ rapid (281) ☐ slow (233) ☐ single (170) ☐ slight rapid head shake (380) ☐ slight slow head shake (74)
      ☐ slight single head shake (66)
    ☐ ➕ head mvmt: side to side (63)
      ☐ rapid (22) ☐ slow (25) ☐ single (16)
    ☐ ➕ head mvmt: jut (503)
      ☐ further forward (4) ☐ slightly forward (37)
      ☐ slightly forward (13) ☐ slightly forward (2) ☐ slightly forward (1)
      ☐ forward (251) ☐ back (56) ☐ slightly forward (18) ☐ slightly back (98)
      ☐ left (4)
      ☐ slightly forward (13) ☐ further back (3) ☐ further forward (1)
      ☐ slightly forward (2)

  ☐ ➕ body lean (649)
    ☐ back/left (50) ☐ back/right (53) ☐ slightly right (35) ☐ left (86) ☐ slightly left (1)
    ☐ right (57) ☐ forward (92) ☐ slightly left (1) ☐ back (78) ☐ forward/right (19)
    ☐ slightly forward (87) ☐ slightly right (4)
    ☐ forward/left (25) ☐ slightly back (60) ☐ slightly left (1)

✏ ABOUT THESE DATASETS

🔍 Sign Search

🔍 **Utterance Search**

💬 Acknowledgments & Credits

🏛 Sign Bank

📊 Statistics

shoulders (141)
back/right (4) down (3) left/down (2) right/down (1) back/left (2)
forward/left (2) raised (38) left/raised (6) right/raised (14)
further raised (5) slightly raised (2) left (7) shrug (23) left/shrug (4)
right/shrug (4) slightly raised (12) right (3) forward (2) Alternating Shoulder Movement (1)
slightly left (1) slightly right (1) forward/right (4)

face (19020)
eye brows (4928)
left raised/right lowered (3) raised (1527) lowered (888)
slightly lowered (646) left raised/right furrowed (2)
slightly raised (650) further lowered (289)
left raised/right furrowed (2) further raised (439)
raised-furrowed (2) raised-furrowed (437)
left raised/right furrowed (1)
right raised/left furrowed (25)
further raised-furrowed (1)
eye gaze (2095)
other (435) up/left (46) to addressee (43) into space (251) up (48)
up/right (63) down/left (126) down (210) left (538) watch hands (106)
down/right (229)
eye aperture (9344)
slightly lowered (620) further lowered (650)
slightly squinted (995) further squinted (561) wider (205)
slightly wide (813) blink (1765) squint (1311) wide (1022) lowered lid (1009)
closed (393)
nose (265)
slightly wrinkled (1) wrinkle (106) slightly wrinkle (1)
tensed (100) slightly tensed (24) further tensed (3)
slightly wrinkled (3) wrinkle left (22) wrinkle right (5)
mouth (2285)
puh (1) pow (2) cs (7) intense (100) open (41) tongue out (81) blow (37) sh (105)
lips spread (174) lips pursed: oo (180)
lips spread & crnrs up (87)
lips spread & crnrs down (245) left tense (5)
left tense (8) bite lower lip (102) tongue on lwr lip (38)
open & round (99) right tense (1) open & tense (65)
open & corners down (44) open & tongue visible (238)
brr (30) smile mouth open (96) lips pursed: oo-tight (60)
lips pursed corners down (58) right tense (108)
left tense (4) left tense (1) left tense (4)
lips pursed: mm (200) raised upper lip (21) left tense (2)
tongue sucked in quickly (6)
lips pursed corners down (2) left tense (1)
left tense (2) tongue mvmt lateral (7) left tense (5)
left tense (1) cha (6) left tense (5) left tense (5)
left tense (1)

cheeks (103)
puffed (49) tensed (16) puff right (4) puff left (3) less tensed (3)
tensed right (16) tensed left (11) more tensed (1)

Search English Translation (Limit the search results to the following...)

Search English Translation..

Figure 3. Utterance Search Options

2. SIGN BANK: INDIVIDUAL SIGNS -- https://dai.cs.rutgers.edu/dai/s/signbank

It is also possible to browse, search, and download individual signs—both citation-form signs and signs pre-segmented, based on manual annotations carried out using SignStream® of start and end points of signs from our continuous signing videos. This search interface is shown in Figure 4.

Figure 4. Search Options for Individual Signs – both Citation-form Signs and Signs Pre-segmented from Continuous Signing

The display on the left is an alphabetical listing of unique gloss ID labels for signs in our collection, with similar lexical variants grouped under a main entry listing, e.g., for APPOINTMENT produced with different handshape configurations, where the main entry APPOINTMENT has entry/variants labelled as (A)APPOINTMENT (produced with the "A" handshape) and (nd-S)APPOINTMENT (produced with the "S" handshape on the non-dominant hand). It is possible to scroll through this list, or to click once in the list and start typing: the cursor will advance to the next occurrence of the typed sequence. It is also possible to search for text contained in the gloss labels or in related English words (this last feature is a new addition), and/or to specify start and/or end handshapes. It is also possible to display specific types of signs, as shown in the pull-down menu at the top. Compounds are displayed with a + sign in between the compound parts, e.g. APPLE+PIE. Compound parts are also displayed, with an asterisk * marking the site of connection to the other part of the compound. So, for example, the primary entry APPLE is listed with the entry/variants shown in Figure 5.

Figure 5. Variants Shown for the sign APPLE

As shown here, the sign APPLE has an entry/variant produced with the "S" handshape, and the sign also occurs as part of the compounds APPLE+JUICE and APPLE+PIE. These are arbitrary labels, not intended to be exact translations. The key criterion is that we have a unique correspondence of label and sign. This is critical to use of these data, e.g., for machine learning (Neidle, *et al.* 2022a).

The number in parentheses provided after the gloss label indicates the total number of examples of that entry/variant in our collection. For example, we have 7 occurrences of the sign variant labelled (nd-S)APPOINTMENT, as shown in Figure 6. The selected sign is displayed with the option to view the video examples in our collection.

Figure 6. Available Videos for (nd-S)APPOINTMENT

In some cases, there is the option to play either the sign video or the sign clip (showing only the portion of the video from the linguistic start point of the sign through the linguistic end point of the sign). For signs from our ASLLVD collection, it is possible to play the "Composite video" to view all

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examples played simultaneously. For signs pre-segmented from our continuous signing videos, it is also possible to play the containing utterance. "Related English Words" can also be displayed by clicking the button near the top of the display; see example in Figure 7.

Related English Words for Sign Variant: (nd-S)APPOINTMENT		
Variant ID	Variant Label	Related English Words
295	(nd-S)APPOINTMENT	appointment, commitment, engagement, meeting, reservation, reserve

Figure 7. Related English Words for (nd-S)APPOINTMENT

The newest option for searching for a sign is to "Search by Video Example" (Neidle, *et al.* 2024). Clicking on the button at the bottom of Figure 4[2] brings up the window shown in Figure 8.

Figure 8. Search by Video Example Interface

The user selects a video clip containing a single sign to upload. The user is asked to specify whether this is a citation-form sign (e.g., from the webcam recording), or a sign segmented from a continuous signing video. In the latter case, the user should choose the linguistic start and end points of the sign to also be the start and end points of the edited video clip. The processing takes about a minute, after which the user is shown their own source video (which will be deleted after processing is complete, to preserve privacy), followed by the top 5 most likely matches, as shown in Figure 6.[3]

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[2] Login is required to access this feature, but users can easily request a free account. Users will be taken first to the login page if they are not logged in when they select "Search by Video Example."

[3] This is based on the sign recognition research reported in Zhou, et al. (2024).
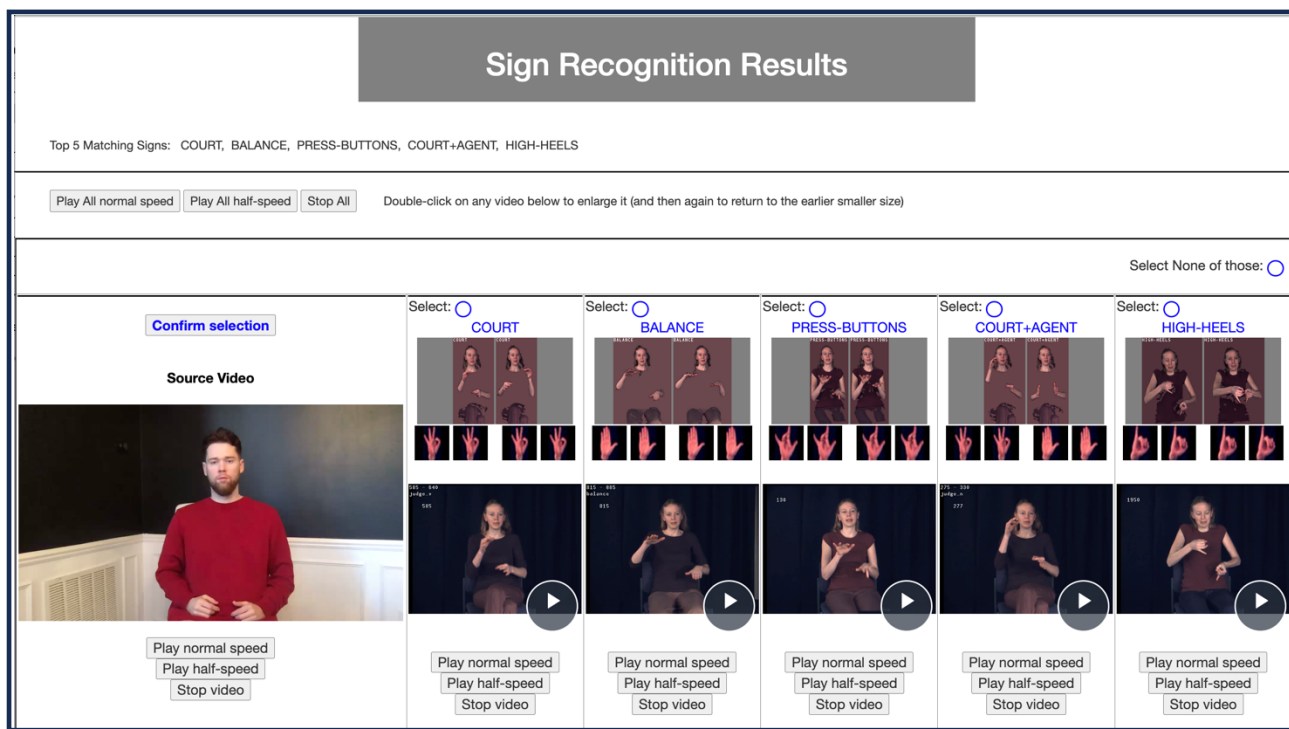
Figure 9. Search by Video Example: Recognition Results for the uploaded video for COURT

The user can play any or all of the videos—at regular or half-speed—before making a selection. The user can also double-click on any video to enlarge it to full screen, and then again, to return to the earlier smaller size.

If there are lexical variants of any of the suggested signs, the user can see those before selecting the appropriate main entry, as shown on the left in Figure 10. The user is then invited to make a final selection, as shown on the right in that same figure, before being taken to the entry of the selected entry/variant in our Sign Bank (as illustrated in Figure 6).

3. Signs that can be Recognized by this System

In all, about 2,360 distinct signs can currently be recognized via video lookup, including lexical signs, loan signs, numbers, and compounds; see Section 4. Our current recognition accuracy for proficient ASL signers is as follows:

Type of video input	Top-1	Top-5
Citation-form signs	81.21 %	95.36 %
Signs segmented from continuous signing	80.39 %	92.96 %

Table 1. Recognition Accuracy

Sign videos from ASL learners, which may differ in production from signs articulated by proficient signers, may be less well recognized.[4] If the search by video example does not produce the desired result, the user can "Select None of those" (at the upper right Figure 9 in which case the user will be returned to the main Sign Bank page, and can proceed to search for the desired sign in other ways (as described in Section 4).

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[4] In collaboration with Matt Huenerfauth at RIT, we plan to carry out user studies in the near future to establish the recognition accuracy for ASL learners.

Top 5 Matching Signs: #BACK, LAST-YEAR, #BANK, COME-HERE, PINK
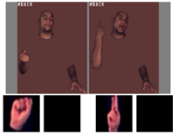
Play All normal speed | Play All half-speed | Stop All   Double-click on any video below to e
size)

ASLLRP Sign Bank

Confirm selection

Select: ●   #BACK

Source Video

Select below | Confirm Final Selection   Options for **#BACK**

#BACK

○	#BACK	Play
○	#BACK_2	Play
○	(2h)#BACK_2	Play

Play normal speed
Play half-speed
Stop video
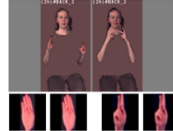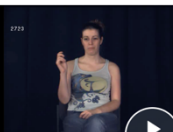
Play normal speed
Play half-speed
Stop video
See Variants

(2h)#BACK_2

Play normal speed
Play half-speed
Stop video

#BACK_2

Play normal speed
Play half-speed
Stop video
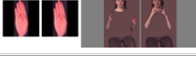
Figure 10. Ability to View Sign Variants before Confirming Selection

4. SOME LIMITATIONS WITH RESPECT TO SIGNS THAT CAN BE SEARCHED VIA LOOKUP-BY-VIDEO-EXAMPLE

The signs that can be identified by our current lookup system do **not** include signs of the following types (except when they are included as components of compounds), although these sign types are included in the ASLLRP Sign Bank:

- *Fingerspelled signs*, *classifiers,* and *gestures.*
- *Index signs.* These signs, which involve pointing to a spatial location that represents a referent or location, are not recognized by video example. Pointing signs have many different uses, meanings, and realizations depending on the context in which they occur. The signs often glossed as IX, in which the pointing is carried out by the index finger, can be used as determiners, locatives, or pronouns, for example. Possessives (produced by pointing with an open palm to the possessor) are also not searchable through uploaded video examples.

| IX | POSS |

Figure 11. Index Signs not Accessible through Lookup-by-video-example

5. OVERVIEW OF AVAILABLE DATA

For statistics of data in the ASLLRP Sign Bank, see https://dai.cs.rutgers.edu/dai/s/runningstats. Further information about these resources is also available (Neidle*, et al.* 2022b), as is further information about our annotation (Neidle 2002, 2007).

6. DOWNLOAD OPTIONS

Users who wish to download data can request a free account. They need to agree to respect the terms of use. Once signed in, they can download data in various ways.

Continuous Signing Data

Once users conduct a search, as described in Section 1, the results are displayed with the option to select data of interest, as shown in Figure 12. The SignStream® collection containing the item of interest will to be added to the Download Cart.

Figure 12. Data of Interest can be Added to the Download Cart

The Download Cart provides access to all the SignStream® collections that are downloadable, and any that the user has explicitly selected will be checked, but users can also add additional collections for download, or download the entire set, as they wish. This is shown in Figure 11.

Figure 13. Download Cart

The user can download the video files for the selections and can download the annotations in two forms: as a SignStream® file (which can be opened using SignStream® software), and/or in an XML extract, which may be easier to use; the format is explained from that site.

Individual Sign Data

From the bottom of the main Sign Bank page shown in Figure 1, users can navigate to pages for download of isolated, citation-form sign data or (a recent addition!) for signs segmented from continuous signing:
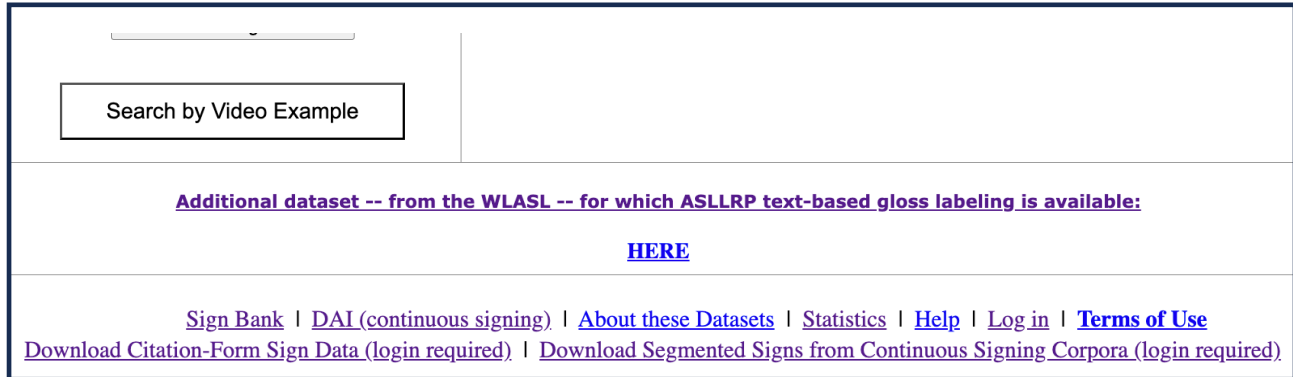

Search by Video Example	

Additional dataset -- from the WLASL -- for which ASLLRP text-based gloss labeling is available:

HERE

Sign Bank | DAI (continuous signing) | About these Datasets | Statistics | Help | Log in | **Terms of Use**
Download Citation-Form Sign Data (login required) | Download Segmented Signs from Continuous Signing Corpora (login required)

Figure 14. Download Pages for Sign Bank Sign Data

These pages allow download of complete collections, for download of the video files and spreadsheets containing information about the data (Neidle & Opoku 2022). Explanations are provided about the contents of those spreadsheets, e.g., as shown for isolated, citation-form datasets, in Figure 15.
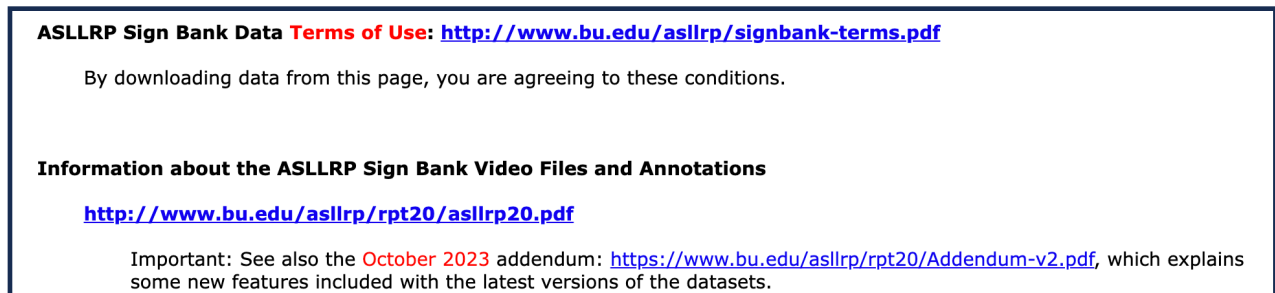
ASLLRP Sign Bank Data Terms of Use: http://www.bu.edu/asllrp/signbank-terms.pdf

By downloading data from this page, you are agreeing to these conditions.

Information about the ASLLRP Sign Bank Video Files and Annotations

http://www.bu.edu/asllrp/rpt20/asllrp20.pdf

Important: See also the October 2023 addendum: https://www.bu.edu/asllrp/rpt20/Addendum-v2.pdf, which explains some new features included with the latest versions of the datasets.

Figure 15. Explanations Provided about Data Available for Download

Separately, we also provide gloss labels for a large subset of the WLASL data consistent with the glossing conventions for the ASLLRP Sign Bank. The WLASL (Li*, et al.* 2020) is a large video dataset for Word-Level American Sign Language recognition, available for download. It brings together many different sets of ASL videos that had been shared publicly. However, there is a serious lack of consistency in the gloss labeling associated with signs across the multiple datasets (Neidle*, et al.* 2022a). See **http://www.bu.edu/asllrp/rpt21/asllrp21.pdf**. These annotations can increase the value of the WLASL data for sign recognition research, by virtue of the consistency in the labels attached to the signs in these collections. Our revised gloss labeling also makes it possible to put data from the WLASL and the ASLLRP Sign Bank together, to create an even larger and richer resource than either of these data sources on their own.

7. ACCESS TO THE SIGN BANK FROM WITHIN SIGNSTREAM®

From SignStream® Versions through 3.4.1

Current and recent versions of SignStream® incorporate the ability to search our Sign Bank via gloss text and/or handshape information, and then to insert the selected sign's properties directly into the annotation (subject to any further editing), as shown in Figure 16. This greatly enhances the efficiency and consistency of annotations.
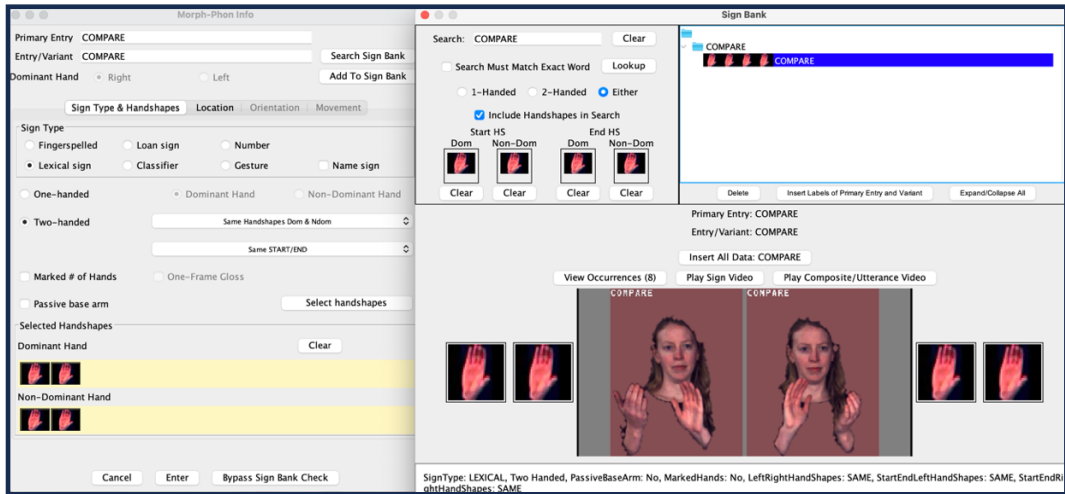

Figure 16. Sign Bank Search from within SignStream®

The information can then be directly entered into the main sentence-level annotation, as seen in Figure 17.
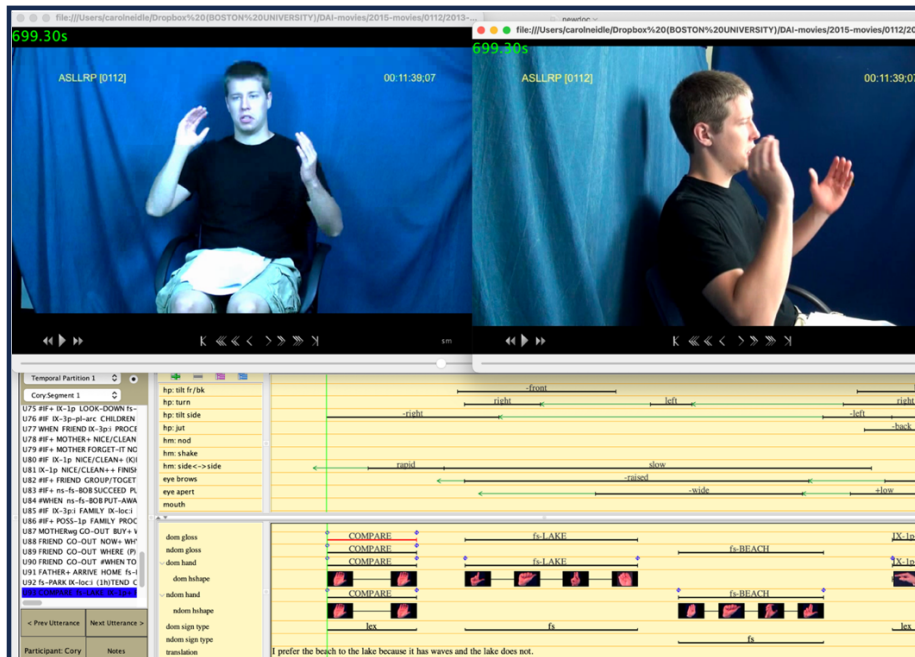
Figure 17. Sign Information Entered into the Utterance within SignStream®

The newest version of SignStream®, to be released in Summer 2024 (Neidle 2024 (forthcoming)), makes it possible, once the user has set start and end points of an unknown sign, to search for that sign through the search-by-video-example module, and then, upon confirmation of the target sign, to enter the Sign Bank information directly into the SignStream® annotation.
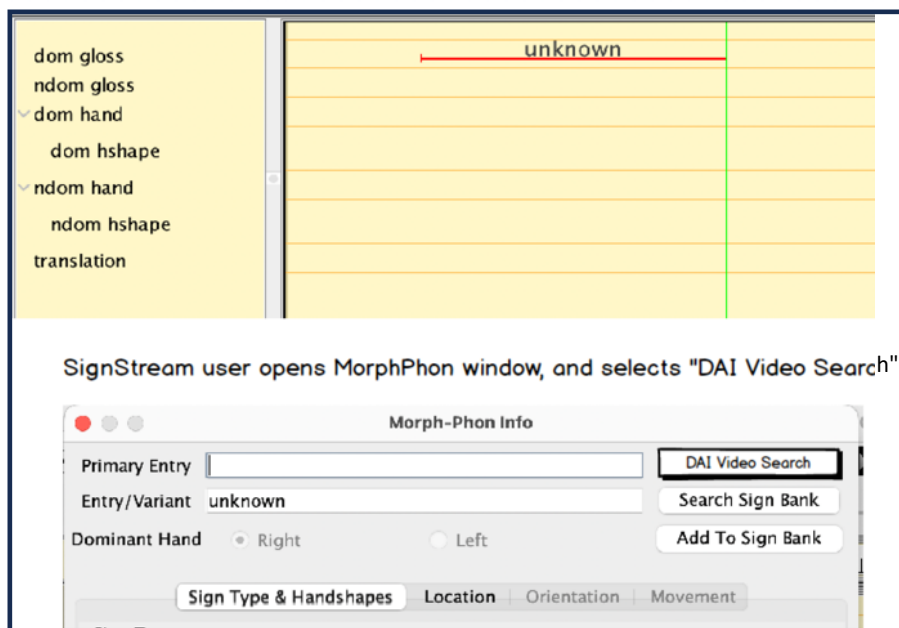
Figure 18. Brand New Search-by-video-example Feature within SignStream®

8. CREDITS AND ACKNOWLEDGMENTS

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