SignStream™ Annotation:

Addendum to

Conventions used for the
American Sign Language
Linguistic Research Project

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Report No. 13
American Sign Language
Linguistic Research Project
http://www.bu.edu/asllrp/

ASLLRP Annotation Schema
version 3.0

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Introduction

♦ **Background information**

The American Sign Language Research Project (ASLLRP) at Boston University

The American Sign Language Linguistic Research Project, henceforth ASLLRP, has been a collaborative endeavor involving the participation of many individuals over the past 15 years or so. The linguistic focus of this project has been the study of the syntax of American Sign Language (ASL); see, e.g., [1, 3, 4, 7, 15-18, 23, 24, 31-33, 40, 41]. In conjunction with this research, we have developed software to facilitate the linguistic annotation and examination of sign language data. The SignStream™ application is described below. See http://www.bu.edu/asllrp/ for further information.

SignStream™

SignStream™ is a Macintosh Classic application[1] for linguistic annotation of visual language data [19, 21, 22, 42]. The program is available on CD-ROM or from our Web site (see Appendix A). A Java reimplementation is currently underway, planned for release in 2008. The new version will contain many new features, including tools for efficient annotation of fine-grained phonological information. It will run on a variety of computer platforms and will be backwards-compatible with transcriptions of data that have been carried out with the current version of SignStream (v. 2.2.2).

National Center for Sign Language and Gesture Resources (NCSLGR) at BU

In collaboration with colleagues at Rutgers University, researchers at Boston University in Linguistics and Computer Science set up a data collection facility with synchronized digital video cameras enabling capture of multiple views of signing by Deaf native users of American Sign Language (ASL). These videos have been annotated using SignStream™, following conventions discussed in *ASLLRP Report No. 11* [21] and this addendum to that report. The data have been an important element not only of our linguistic research, but also of collaborative work with computer scientists (Dimitris Metaxas; Gabriel Tsechpenakis; Christian Vogler; Stan Sclaroff, *et al.*) interested in the problem of sign language recognition [2, 6, 12-14, 20, 42-51]. These data are available to researchers, as explained below. See http://www.bu.edu/asllrp/cslgr.

Data Distribution: ASL Video with Linguistic Annotations

The full list of data now available is contained in Appendix A. The 2007 data release includes 15 short narratives as well as over 200 individual elicited utterances incorporating a range of different syntactic constructions (for a total of just about 1,100 utterances in all). These are distributed on CD-ROM and over the Internet. It will also soon be possible to search through these data sets through a Web interface currently under development, which will also enable download of those video files (available in a variety of formats) and annotations that may be of interest. The annotations are available not only as SignStream™ database files, but also as XML (see Appendix C for the XML specifications). This report, in conjunction with [3], explains the conventions used for these annotations.

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[1] Note that the newest Macintosh computers with Intel processors do not support Classic applications, nor does the Leopard operating system that Apple has announced for release in October of 2007.

♦ Purpose of this document

This report is intended to supplement and extend ASLLRP Report No. 11 [21] , which described the conventions used for the data we had annotated using SignStream™ until that time. This document discusses issues that have arisen since then with respect to the annotations and is intended to provide explanations for the annotation conventions of the ASLLRP 2007 Data Release. We discuss the considerations that led us to make particular choices. Different circumstances, annotation tools, and linguistic interests could very well lead others to make different choices. We hope, at least, that raising these issues may help others to arrive at their own coding decisions.

Important note: This discussion builds on what was established in [21], which includes essential explanations and caveats about interpretation of these annotations. The conventions described in these two documents combined will be referred to as version 3.0 of the ASLLRP Annotation Schema.

♦ Organization

The first part of this report focuses on the choices of English glosses for ASL signs. The second part addresses the problems with annotation of ASL gestures. Examples and illustrations provided throughout this report are taken from the stories, listed on page 27; complete information about available data is provided in Appendix A. Appendix B reiterates information from [21] about handshape labels, for convenient access. Appendix C provides the DTD for the SignStream™ XML format.

♦ Acknowledgments

Challenges for consistency with large amounts of data

The attempt to represent ASL signs via glosses from a totally different language, English, poses certain unavoidable problems. This has necessitated choices involving trade-offs of various kinds. Decisions have been made with a view to how the gloss annotations will be exploited. However, some of these have been arbitrary, and many would not be obvious without explanation. This document—in combination with *SignStream™ Annotation: Conventions used for the American Sign Language Linguistic Research Project*, ASLLRP Report 11 [21]—is intended to assist those who wish to make use of the annotated data described in Appendix A in understanding what the annotations actually mean.

This report is also intended as documentation of choices that have been made to assist those who will be continuing to work on this project. As additional data are added to our collection, consistency with respect to annotations is critical to the overall utility of the data set.

To facilitate both linguistics and computer science research, we have tried our best to settle on conventions to ensure that every time a particular English gloss is used, it corresponds to a unique ASL sign, and conversely, that the same ASL sign will have a predictable English gloss.

♦ ASL variants differing in handshape

For cases where there were close variants of a single ASL sign (which would most naturally have the same English gloss), we added information about handshape—in parentheses, preceding the gloss—to distinguish them, as shown in Figure 1. If only one variant includes a notation of handshape, the unmarked form of the sign (or the variant that occurred most frequently in our corpus) is generally the one left without indication of handshape. The "code" for interpreting handshape labels is found in Appendix B. In one case, there was no standard handshape descriptor available to distinguish two signs. A variant of BETWEEN was glossed as "(vulcan)BETWEEN" since the non-dominant handshape is reminiscent of that used as a Vulcan salute on Star Trek.

♦ Non one-to-one correspondence between English glosses and ASL signs

Most ASL signs can be used in a variety of ways, and, depending on their usage, can have multiple translations into English. Likewise, a single English translation may be appropriate, in various contexts, for more than one ASL sign.

There are certain English words that might, depending on context, be the most appropriate translation for several different ASL signs. Consider, for example, the verb "leave," which itself has several different meanings and usages in English, as in (1) and (2).

(1) I left (the party).

(2) I left the book on the table.

One option for annotation would have been to simply gloss ASL signs as LEAVE-1, LEAVE-2, and so on. However, we decided instead, in such cases, to choose different English words to be used consistently with each of the variants. Figure 2 shows the alternative glosses that have been adopted, reserving LEAVE as the gloss for the sign that begins with both hands palms down and then has sideward movement of the hands that change to an A handshape.

This does *not* mean, however, that the differences in meaning of the English words have any necessary relationship to the differences in sign meaning, although in the rare cases where it was possible to convey distinctions in meaning through the glossing, we did so. For example, there is a sign that seems to involve aspects of both the meaning and articulation of TAKE-OFF and EXCUSE, which was glossed as EXCUSE-GO, shown in Figure 3.

Similarly, there are several uses of "look" in English, as in examples (3)-(5).

(3) John looked (up/at the wolf).

(4) John looked tired.

(5) John looked like his father.

Figure 4 illustrates the glossing conventions we have used for the various meanings of "look," the last of which is a compound (as indicated by the +).

The sign for "open" varies depending on what is being opened. We used the gloss OPEN-BOOK to distinguish that sign from the sign usually glossed as OPEN. These are both illustrated in Figure 5.

For signs with very close meanings and various but overlapping English translations, we made sometimes arbitrary assignments of English glosses, and we followed these conventions to ensure consistency. Sometimes these glosses were supplemented by handshape information. Examples are shown in Figure 6 through Figure 7. The gloss TALKwg incorporates information about the articulation: finger wiggling. A similar notation was used to distinguish a variant of the sign FINISH that occasionally involves shaking of the hands (rotation of the wrists), as illustrated for the gloss FINISH-shake in Figure 8.

The many signs (and their variants) for conveying the idea of no, none, nobody, nothing posed a particularly difficult challenge. The choice of English glosses in this case provides virtually no information about the range of meanings and usages that all of these signs can have. An attempt was made, again, simply to provide unique labels, as illustrated in Figure 10.

Lack of standardization of glossing conventions

One obvious problem with the use of English glossing is the lack of standardization. In Figure 11 and Figure 12, illustrations are provided for a few glosses that may not be transparent (or for cases in which other glosses might alternatively have been used).

Many-to-one (and many-to-many) relationships between ASL signs and English translations

As in all languages, it is possible to have two very different words/meanings that "sound" the same. There are, unsurprisingly, ASL signs that can have very different meanings, and thus very different ways of being translated into English. There are also cases where the ASL sign does not have a very good translation into English at all, because there is no word in English that is used in quite the same way. In cases like these, we have used two English words separated by a slash. For some signs, of course, the list would grow quite long if it were to include all possible English translations. For example, we used the gloss PRICE for the sign that can mean "cost," "tax," "toll," "fee," "fine" (as in one of our stories), "penalty," or "price." As with all of the glosses, there are meanings of the sign that simply are not represented in the

conventional gloss that is being used (making the gloss seem quite odd in certain contexts). Some examples are included in Figure 13. These glosses also face the same issues mentioned elsewhere in this document, including those related to parts of speech, to be discussed next.

Parts of speech: One ASL sign corresponding to more than one English POS

Sometimes an ASL sign can function as more than one part of speech, e.g., both a noun and a verb, or both an adjective and an adverb. Despite the fact that the optimal English translations on those two usages would frequently be different, we have generally chosen a single English translation. Sometimes the choice of English word was arbitrary; sometimes it was motivated by frequency of occurrence of the signs with the various meanings. Some generalizations about the choices we made are listed here:

- For verbs that can be used to translate both verbs and participial adjectives in English (e.g., "tempt" or "tempted"), we have generally used the verbal form (TEMPT). Thus, for example, the sign that can mean either "bored" or "boring" is glossed as BORE. Other similar examples include FINISH (which can used to express the English adjective "finished," as in "Are you finished?"), MOTIVATE (which can mean "motivated"), and SCARE (which can mean "scared").

- For signs that in ASL only have an adjectival form, even though English productively uses both a verbal and adjectival form of its nearest translation, we have opted for the participial/adjectival English word (e.g., RELIEVED, FASCINATED).

- There are also some signs that can be used as either nouns or adjectives. For example, the sign NAUSEA is used in one of our examples as an adjective meaning "gross" or "disgusting." The nominal form is used for that English gloss. The gloss DIFFERENT was used to translate both the adjective, "different," and the noun, "difference." The adjective SICK, with reduplication also functions as a noun (meaning "disease"). There are two verbs that frequently translate the English "give". We have glossed one of them as GIVE and the other as GIFT (as it also has the possibility to be used as a noun). These are illustrated in Figure 14.

- For signs that could have a prepositional or verbal meaning, generally, we stayed with the preposition for the English gloss. For example, ACROSS was used for the sign sometimes corresponding to the English preposition "across" and sometimes to the verb meaning "to cross."

- There are many ASL signs that can function as both nouns and verbs, whereas the forms would be different for the English translations. We have used APPLAUSE for both "applaud" and "applause," BLOOD as to translate the English "blood" and "bleed," LIVE to translate both "live" and "life," INFORM to translate both "inform" and "information"; the nominal form in ASL may, but need not, involve reduplication of the stem, which is indicated by + when it occurs. The same is true for the noun "advice" and the verb "advise," glossed as ADVISE, with a + to mark the reduplication frequently found with the nominal forms. We use the gloss ADVANTAGE both for the noun and for the verb meaning "to take advantage". For "mind", we glossed the noun as MIND and a verb used in constructions such as "would you mind… ?" as NOT-MIND; see Figure 15.

- In general, we used the same gloss, but different parts of speech, for signs that can function in different ways syntactically, e.g. READY (used either as an adjective or a verb meaning "to get ready"). However, in some cases, particularly when the English translations have significantly different (albeit sometimes morphologically related) forms, we included more than one possible English translation with a slash, as in LEGAL/LAW, FAVORITE/PREFER.

- Sometimes a single gloss has the possibility to function as multiple parts of speech, e.g., CONFUSE (meaning "confuse," "confused," or "confusion").

- In some cases, we opted for best translation of the most frequent usage. For example, REALLY, which is appears quite a lot in our data set, used especially by one of our signers as a kind of discourse marker, can also have a variety of other meanings (not all of them adverbial), including 'true' or 'sure.' We have stuck with that same gloss, REALLY, in all cases, except when it occurred as part of the idiomatic expression, TRUE-BUSINESS.

We have also had cases of the converse situation: i.e., a single English word that can be used with more than one part of speech, but where the translations would be different in ASL based on the syntactic category. For example, "phone" or "telephone" in English are both used as nouns and verbs. However, the corresponding noun and verb in ASL are distinct. For this case, we used PHONE as the noun and CALL-BY-PHONE as the verb in our glosses. (Note that there is a different sign, CALL.) These are illustrated in Figure 16.

Two morphologically related ASL signs ending up with morphologically unrelated English glosses

We have, in some cases, (regrettably) obscured the relatedness of ASL signs by giving them glosses that display no relationship in English. An example of this was just mentioned: the fact that the idiomatic TRUE-BUSINESS incorporates a morpheme that we have elsewhere glossed differently, as REALLY. In the interest of having unique English glosses for different signs, for example, we have used MISTAKE and WRONG as English glosses for ASL signs that are quite similar in their articulation, as shown in Figure 17. Another case in which two ASL signs that are related in meaning and that look very much alike receive English glosses that obscure this relatedness is illustrated in Figure 18.

♦ **How much morphological decomposition to include in glosses?**

In general, we opted for limited overt indication of the internal morphological structure of ASL signs, thereby (regrettably) obscuring morphemes that are common to different signs. For example, the agentive –er suffix in English has a counterpart in ASL, a suffix meaning "person" added very productively to verbs. We used the gloss TEACHER rather than TEACH+PERSON. (We included morphological detail only in one case, for "Bostonian," where the name sign for Boston was followed by that suffix. We glossed that as ns-BOSTON+PERSON.)

Similar choices arose with compounds. We did gloss the signs for "lunch" and "dinner" as EAT+NIGHT and EAT+NOON, respectively. We also glossed the sign that would be translated as "shopping" as a reduplicated form containing the verb BUY, with the + sign marking the reduplication: BUY+ . However, we used the gloss STORE for the noun produced by a double articulation of the sign for the verb SELL.

♦ Part of speech labeling

Given the fact that similar ASL forms can sometimes be used for different parts of speech, as discussed on page 5, it is not always completely clear what part of speech is involved. This makes labeling of parts of speech a difficult task. In some constructions, this is exacerbated by the fact that ASL is a null copula language. For example, a predicative adjective and a verb can both be found immediately following the subject. Another difficult case we encountered were utterances that consisted of a single sign, especially in "Scary Story." Sequences such as:

RAIN. LIGHTNING. THUNDER.

These could be sequences of sentence fragments containing nouns—painting a narrative portrait—or they could be verbs: "It was raining…" etc. Sometimes when this was unclear, arbitrary choices were made in the labeling of parts of speech.

Furthermore, in some cases, more than one of the category labels we are using would be appropriate. For example, for possessive pronouns, we have used the label 'possessive' whereas we might just has well have tagged them as pronouns. A similar situation arises with demonstratives, which have generally been labeled as such, regardless of other syntactic functions.

♦ A word of caution to computer scientists

One problem involved in the segmentation of narratives into "utterance"-length chunks (with the divisions between units not always corresponding exactly to sentence boundaries) is that there is continuity of signing from one unit of annotation to the next. There are cases, for example, where the new "utterance" includes the tail end of a prior sign or non-manual expression. Annotations of very brief behaviors (e.g., single frame) at the start of a sentence might best be disregarded as exemplars of entire signs. There may also be behaviors (of the non-dominant hand especially) that continue for longer durations from the very beginning of an utterance, but that are in fact remnants of the articulation of a sign from the previous utterance.

Illustrations of glosses

Note for all figures: If more than one picture is included for a sign, these represent frames from the video sequence, in chronological order (the first usually at or near the beginning, and the last at or near the end of the production of that sign).

| BORN | (S)BORN | (vulcan)BETWEEN |
| STORY | (crvd-sprd-B)STORY | A non-standard handshape |

Figure 1. ASL variants distinguished by handshape

| DEPART | TAKE-OFF | LEAVE-THERE |

Figure 2. Glosses for signs that can translate English "leave"
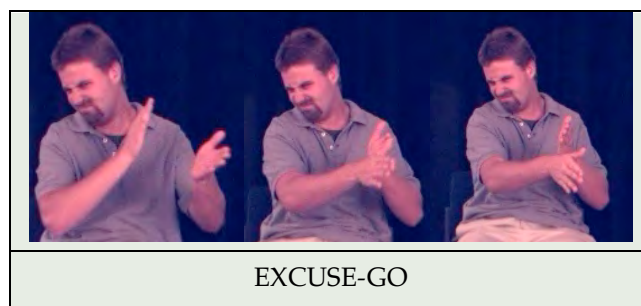
EXCUSE-GO

Figure 3. Sign glossed as EXCUSE-GO

| LOOK | LOOK-LIKE | LOOK+SAME (start and end) |

Figure 4. Glosses for signs that can translate English "look"

| OPEN | OPEN-BOOK |
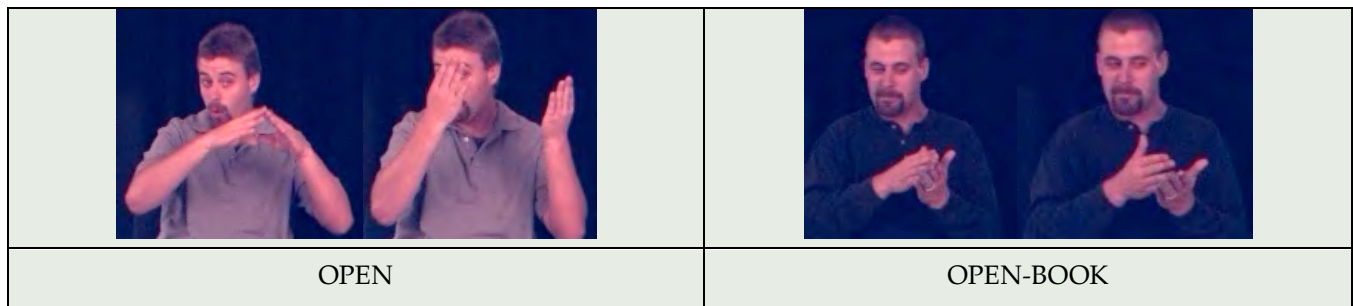
Figure 5. Glosses for signs that can translate English "open"

| PAY | (flat-O)PAY |
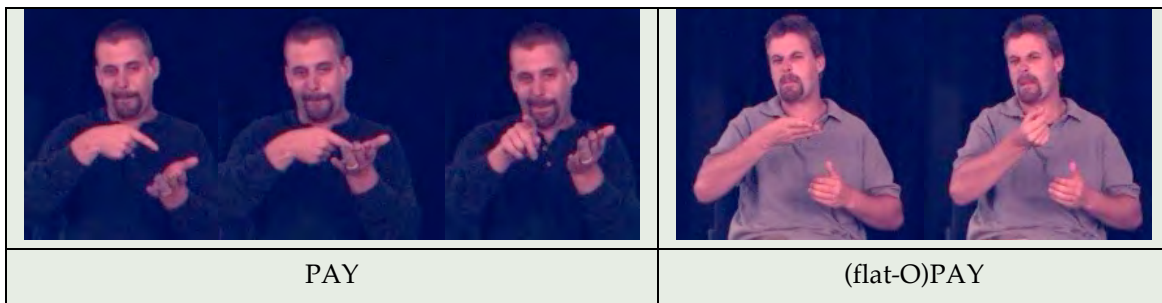
Figure 6. Two signs that can be used to translate English "pay"

| TALK | TALKwg (with fingers wiggling) | SIGN | USE-SIGN-LANGUAGE |
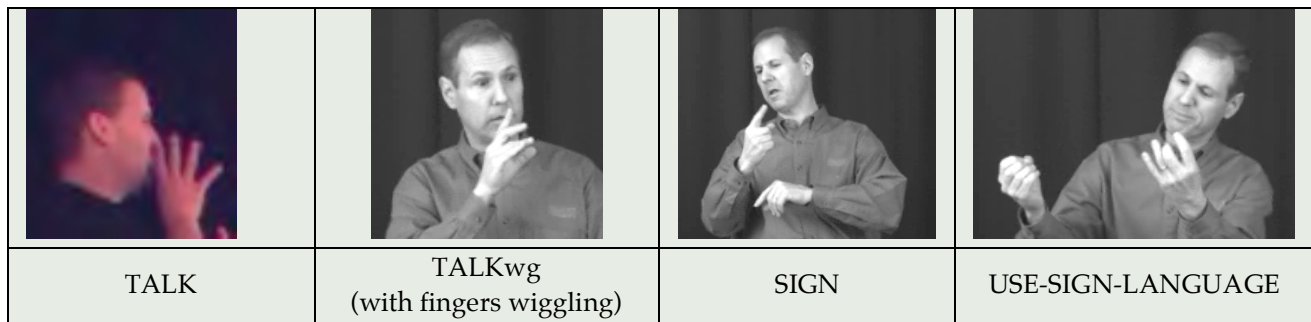
Figure 7. Glosses for signs about talking/signing

| FINISH | FINISH-shake |
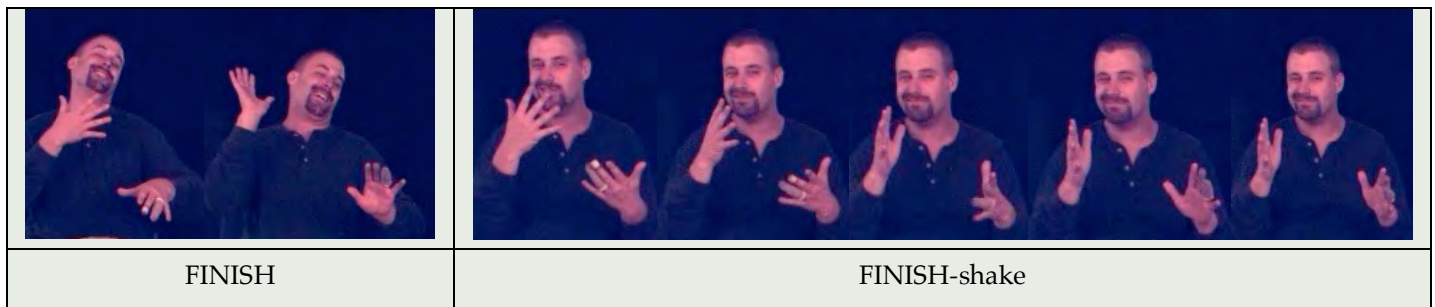
Figure 8. Glosses for FINISH vs. FINISH-shake

| OUTSIDE | GO-OUT |
| OUT | GET-OUT |

Figure 9. Glosses for signs corresponding to "out" in English

| (side to side movement) | (side to side movement) | (start and end) |
| (O)NONE | (F)NONE | (O>5)NOTHING |

| (arms cross) |
| (O)NONE/NOTHING |

Figure 10. Several of the many ASL signs for "no," "none," "nothing," "nobody"

ALL-THE-WAY	TOTAL
STRAIGHT-ALL-THE-WAY	FALL-INTO-PLACE
PLAY-AGAINST	FALL-INTO-IT
GAME	LONG-LIST
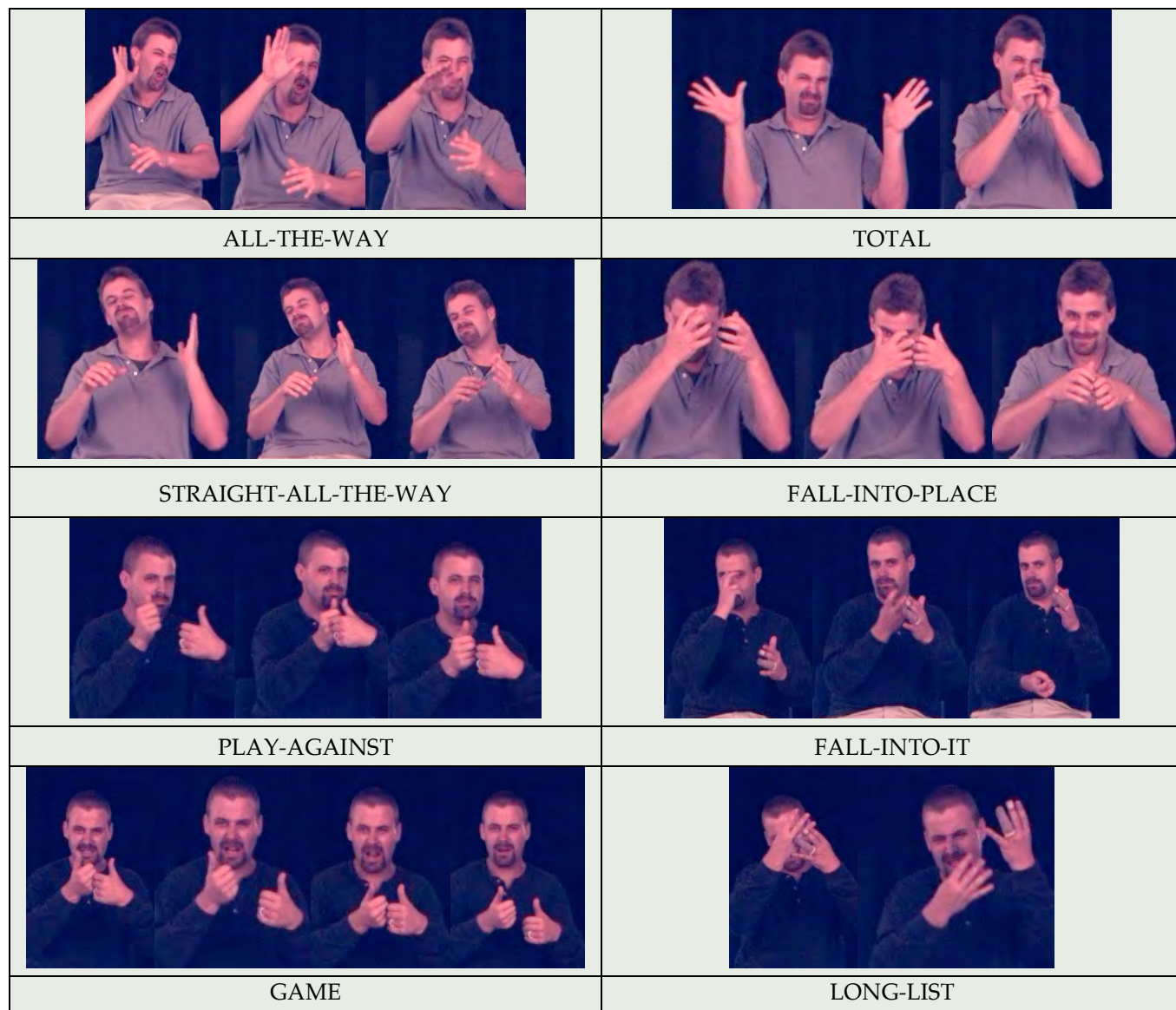
Figure 11. English glosses for several ASL signs in our data set
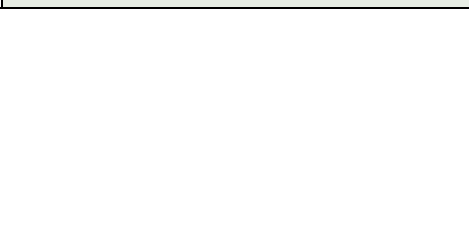
GONE	ALL-GONE
(2h)EMPTY	SET-ASIDE
	OVER-NIGHT
GRAB-CHANCE	ALL-NIGHT
STAY-AWAKE	STAY-AWAKE-ALL-NIGHT

Figure 12. English glosses for other ASL signs in our data set
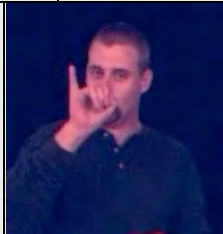
MELT/SOLVE		FINALLY/SUCCEED
OVER/AFTER	ANYWAY/NOT-MATTER	CITY/COMMUNITY
SPECIAL/EXCEPT	INSURANCE/INFECTION	PACE/PROGRESS
	SPEECH/LECTURE	CREATE/PRETEND

Figure 13. Signs with multiple English translations, depending on usage
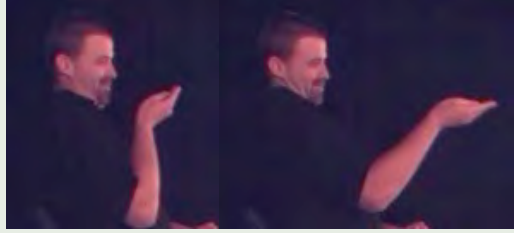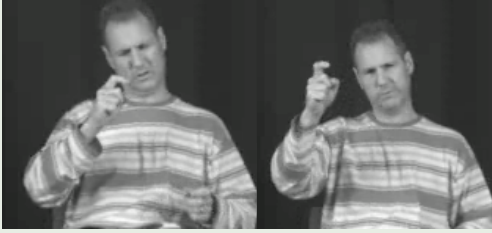
GIVE (verb)	GIFT (used as noun or verb)

Figure 14. Glosses for English "give"

MIND	NOT-MIND
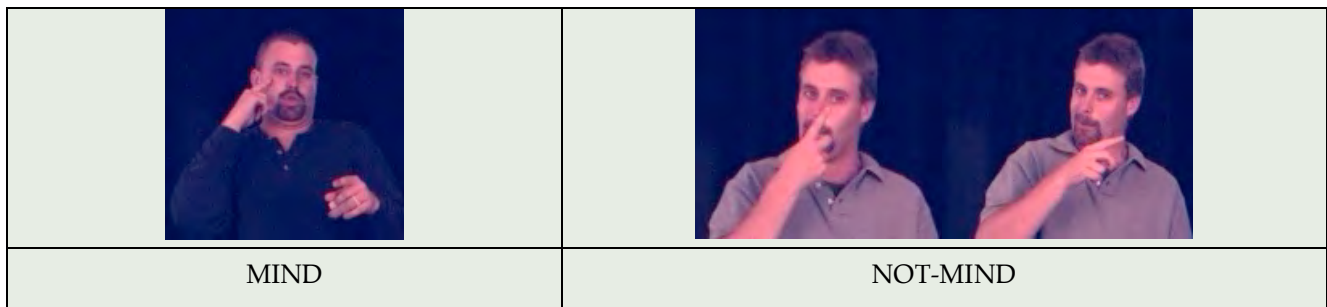
Figure 15. Glosses for English "mind"

PHONE (N)	CALL (V)

CALL-BY-PHONE (V)   [bandaged finger affecting final handshape]

Figure 16. Glosses for English "telephone," "call"

(used as a verb) note: twist of wrist	(generally used as a noun or adjective)
MISTAKE	WRONG
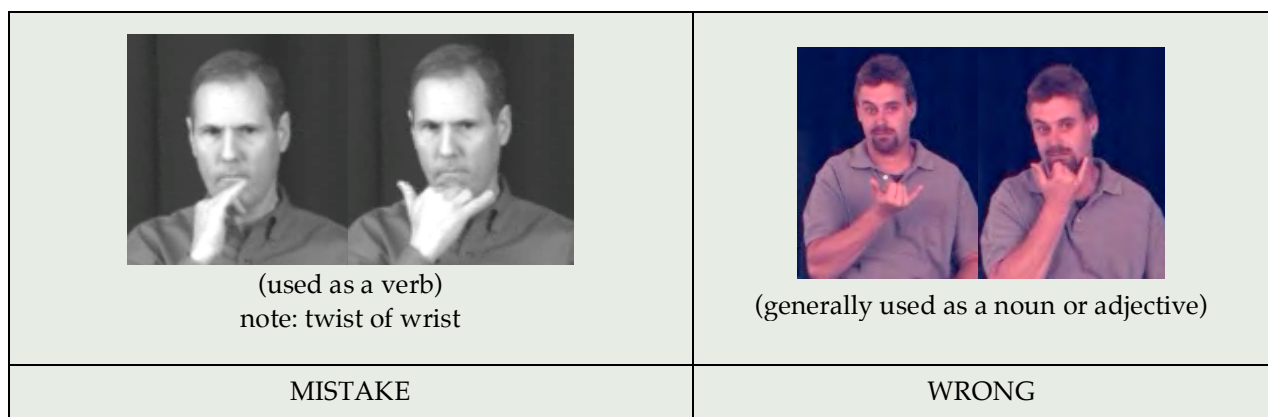
Figure 17. Morphologically related ASL signs glossed as MISTAKE and WRONG

[note: two contacts with body]	(used to translate both "live" and "life")
RESIDENCE/ADDRESS	LIVE

Figure 18. Morphologically related ASL signs glossed as RESIDENCE/ADDRESS and LIVE

Consistency in the annotation of gestures

♦ Some comments on the annotation of gestures

The annotation of gestures turned out to be one of the least straightforward challenges we faced. In our data, we discovered gestures that seemed to recur frequently for individual signers or across signers. For most of these, no conventional glosses are available. Thanks to Quinn Duffy for his painstaking efforts in helping to sort through these gestures and to establish some commonalities of meaning and consistency of glossing. To the extent that *some* consistency has been achieved, this will facilitate the study of gestures in this corpus. All of this is a rich area for further study (and a careful study of these gestures would, in turn, surely lead to better conventions for labeling).

Gestures vs. signs

It is not always clear where to draw the line between signs (glossed with capital letters) and gestures (which include the meaning, as best we can capture it, in quotation marks and not in capital letters, sometimes preceded by an identifying handshape) . How conventionalized and frequent does the gesture have to be before it is considered a sign? The answer is not clear, and some arbitrary decisions were made, of necessity.

Difficulties in capturing meanings and choosing labels

Although there are recurrences of similar manual gestures, there are often subtle (or less subtle) differences in meaning (sometimes conveyed through non-manual expressions). These are gradient, precisely because they are gestural; so it is often difficult to categorize them precisely. There are trade-offs in glossing between capturing the similarity of the different occurrences *vs.* the nuances in meaning. The "meanings" in quotation marks are, at best, a rough approximation (and may capture what was intended better in some contexts than in others). It would be a mistake to pay much attention to the English words used in these labels. For example, there is a frequent use of open palms (5 handshape) that serves as a carrier of affective information, the essence of which is in fact expressed non-manually. Some of these are illustrated at the top of page 17. Similarly, there is a range of gestures that function as filled pauses of one sort or another, where meaning is pretty much impossible to capture (labeled as "you know," "you see," "hesitation," "looking for words," etc.). Subcategorization of these gestures is extremely difficult.

Below are listed some of the common gestures, along with the annotation we have used for them, and the source of each of the examples illustrated. The stories from which these examples are taken are listed by their brief titles; full reference information is provided in Appendix A (Data distribution) and Appendix D (References). A table with information about the particular stories from which these examples were taken is found at the end of this section.

We group gestures here according to articulatory properties.
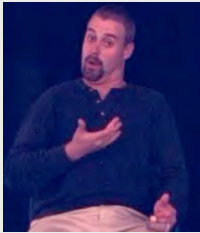
♦ **Palms Up**

5″sheepish″	5″resignation″	5″trepidation″
[Whitewater, U 32]	[Roadtrip 1, U 17]	[Dorm prank, U 48]
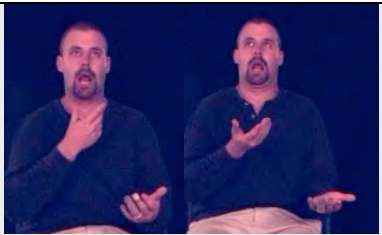
5″dumbfounded″	5″frustration″	5″exasperation″
[Whitewater, U 28]	[Siblings, U 24]	[Dorm prank, U 26]
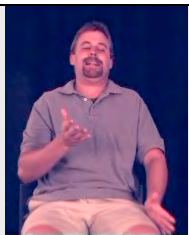
(frequently with head nod)	
5″that's the way it is″	5″everything in order″
[Speeding, U 27]	[Whitewater, U 22]
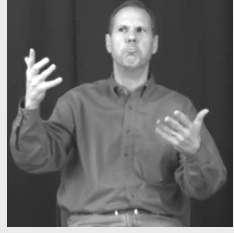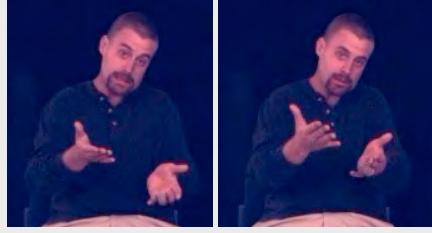
5″you know″	5″you see″
[Boston-LA, U 22]	[Accident, U 62]

5″actually″	5″ok (giving in)″	5″looking for words″
[LAPD, U 88]	[LAPD, U 91]	[Whitewater, U 51]

5″I don't know″ (sometimes both hands remain low)	(2h)5″I don't know″
[Scary story, U 40]	[Football, U 25]

5″out of my control″	5″not know what to do″
[Accident, U 48]	[LAPD, U 45]

5″panic″	5″aw, man″	B-L″go on″
[Three pigs, U 40]	[Roadtrip 1, U 13]	[Speeding, U 24]

5″of course″	5″let's see″	5″come on″
[Roadtrip 1, U 25]	[Three pigs, U 53]	[Accident, U 9]
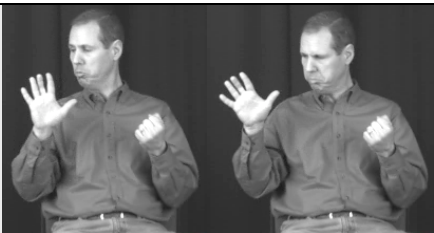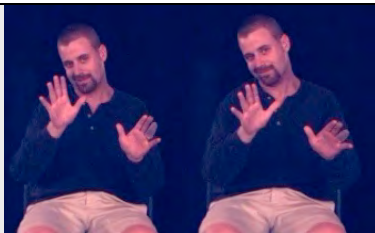
5″what's going on?″
[Scary story, U 19]
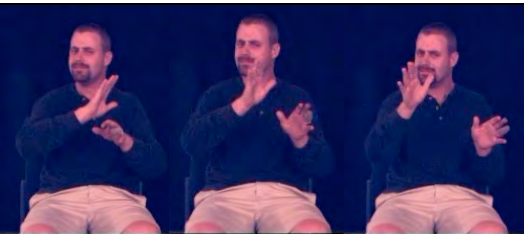
5″concession″	5″ok, hey″ (introducing a clause that's going to be followed by a *but…*)
[Football, U 45]	[Football, U 53]

♦ **Palms Out**

5″oh well″	5″what the heck″
[Roadtrip 1, U 17]	[Accident, U 22]

Sideways Movement
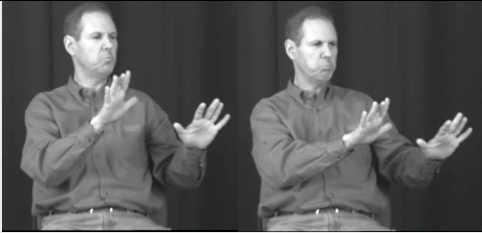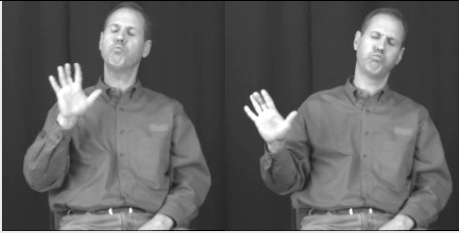
5″to let you know, it's OK″	5″reassure″
[Speeding, U 40]	[Boston-LA, U 47]

(hands move back and forth along a plane)	(outward motion)
5″wave no″+	5″wave no″
[Roadtrip 2, U 38]	[Accident, U 60]

5″hey, no″	5″no more″
[LAPD, U 59]	[Dorm prank, U 54]

5″anyway″	5″keep in mind″
[Roadtrip 1, U 10]	[Boston-LA, U 47]

Movement Away from Body

5″it's ok″	(1h)5″it's ok″
[Three pigs, U 49]	[Speeding, U 20]

5″hey″	5″for our sake″	5″hands off″
[Speeding, U 22]	[Roadtrip 2, U 27]	[Dorm prank, U 54]

| 5″got it?″ |
| [Roadtrip 2, U 24] |

Movement Down

| 5″forget it″ ||
| [Three pigs, U 13] | Dorm prank, U 7 |

(often with head nod)	
5″so, all set″	5″not a big deal″
[Accident, U 62]	[Whitewater, U 60]

♦ **Palms Down**

| 5″set″ | 5″whoa″ | 5″ahh″ |
| [Dorm prank, U 16] | [Whitewater, U 33] | [Whitewater, U 66] |
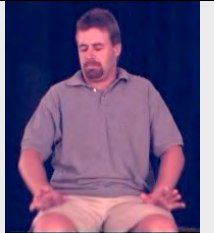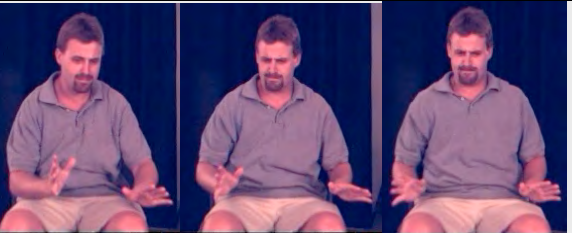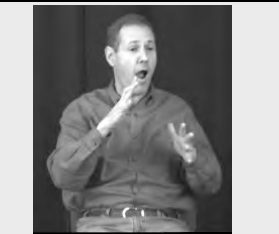
5″sigh″	5″dismissive gesture″
[Whitewater, U 66]	[LAPD, U 44]

5″calm down″	5″reassuring self″	5″checking it out″
[LAPD, U 100]	[Scary story, U 25]	[Scary story, U 19]

5″listen up″	
[Roadtrip 2, U 11]	[Football, U 50]

♦ **Palms facing each other/Center**

			(slight wiggle at wrists)
5″so, ok″	5″surprised″	5″so-so″	5″oh gosh″
[Three pigs, U 40]	[Three pigs, U 68]	[Ali, U 21]	[LAPD, U 53]

FORGET-IT	5″nah″
[Whitewater, U 24]	[LAPD, U 19]

5″let it go″ (as in let go of a topic/thought/desire)	5″leave it at that″
[Ali, U 9]	[Roadtrip 2, U 21]
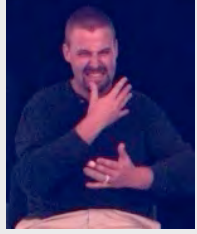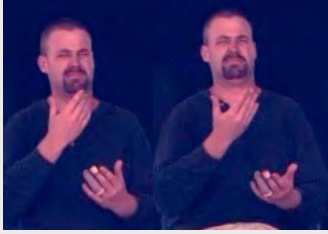
5″this is nothing″	5″drop topic″
[Whitewater, U 23]	[Roadtrip 1, U 28]

B-L″go ahead″	5″come here″
[Boston-LA, U 77]	[Ali, U 3]

"gees"

[Dorm prank, U 35]

"oh my god"

[Dorm prank, U 35]

(clap hands together and rub them)

5"ok, let's see"

[Whitewater, U 8]

5"waiting for news"

[Siblings, U 18]
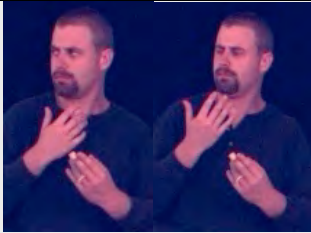
♦ **Palms facing body**

5"wow"

[Siblings, U 18]
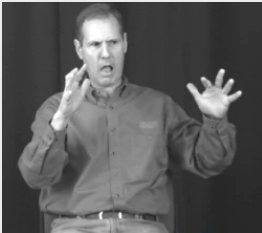
5″reluctance″	5″perplexed″	5″relieved″
[Accident, U 19]	[LAPD, U 25]	[Accident, U 51]

Sideways Movement

5″things proceeding normally″	5″taken aback″
[Accident, U 19]	[LAPD, U 24]

♦ Other Gestures

5″hesitation″ note: changes a lot depending on what is before/after it generally any pause between signs that indicates stopping suddenly (in role shift) or searching for words	
[Three pigs, U 61]	[Dorm prank, U 42]

″darn″	R″hoping″
[Ali, U 37]	[Siblings, U 10]

♦ **Stories from which the above examples were taken**

Story title	Citation info (see Appendix D)	CD-ROM distribution (see Appendix A): NCSLGR SignStream™ Databases [2007]
Close Call	[34]	Vol. 3
Speeding	[35]	Vol. 3
Three pigs	[36]	Vol. 3
Accident	[37]	Vol. 4
Biker	[38]	Vol. 4
Boston-LA	[39]	Vol. 4
Ali	[25]	Vol. 5
Dorm prank	[26]	Vol. 5
Whitewater	[30]	Vol. 5
Football	[27]	Vol. 6
LAPD	[28]	Vol. 6
Siblings	[29]	Vol. 6
Roadtrip 1	[9]	Vol. 7
Roadtrip 2	[10]	Vol. 7
Scary story	[11]	Vol. 7

Appendix A. Available software and data

All of the CD-ROM's listed below are distributed by Carol Neidle through the American Sign Language Linguistic Research Project at Boston University.

♦ The SignStream™ application

The SignStream application can be downloaded from the Web site or obtained on CD-ROM: http://www.bu.edu/asllrp/SignStream; http://www.bu.edu/asllrp/signstream/other_materials.html.

♦ NCSLGR Data Sets

Earlier collections

The first two CD-ROM's that were distributed are listed below. Video files for data collected through the National Center for Sign Language and Gesture Resources (NCSLGR) at Boston University are available in a variety of formats. Further information is available from our Web site: http://www.bu.edu/asllrp/cslgr/ .

ASLLRP SignStream™ Databases, Vol. 1, version 2 [2003]

This CD-ROM contains SignStream™ transcriptions of excerpts from several stories distributed on video by DawnSignPress (http://dawnsignpress.com/). These video clips were provided in digital format by DawnSignPress and are used here with permission. We gratefully acknowledge and appreciate their making these videos accessible for this purpose. The database files include:

1. DSP Dead Dog Story

2. DSP Immigrants Story

3. DSP Introduction to a Story

4. DSP Ski Trip Story.

This version incorporates corrections since Version 1, and is consistent with the annotation conventions described in ASLLRP Report 11.

NCSLGR SignStream™ Databases, Vol. 1 [2003]

This CD contains data collected in the National Center for Sign Language and Gesture Resources at Boston University and annotated with SignStream. SignStream™ version 2.2.2 is required. The 8 SignStream database files contain over 200 utterances, with 3 synchronized video files for each utterance (a front view, side view, and close-up of the face).

The annotation conventions used here are described in ASLLRP Report 11.

NCSLGR Data Release 2007

Summer 2007 marks the release of 6 additional CD-ROMs containing elicited utterances (Vol. 2) and short narratives (Vols. 3-7). All of these require SignStream™ version 2.2.2, and all the video data were collected in the NCSLGR.

NCSLGR SignStream™ Databases, Vol. 2 [2007]

The 8 SignStream database files contain over 200 utterances, with 3 synchronized video files for each utterance (a front view, side view, and close-up of the face).

NCSLGR SignStream™ Databases, Vol. 3 [2007]

The following narratives are included (SignStream database files with a total of 169 utterances, each with 4 synchronized video files—2 stereoscopic front views, a side view, and a close-up of the face):

 1. Close call

 2. Speeding

 3. Three pigs

NCSLGR SignStream™ Databases, Vol. 4 [2007]

The following narratives are included (SignStream database files with a total of 171 utterances, each with 2 synchronized video files—a front view and a close-up of the face):

 1. Accident

 2. Biker

 3. Boston-LA

NCSLGR SignStream™ Databases, Vol. 5 [2007]

The following narratives are included (SignStream database files with a total of 157 utterances, each with 3 synchronized video files—a front view, a side view, and a close-up of the face):

 1. Ali

 2. Dorm prank

 3. Whitewater

NCSLGR SignStream™ Databases, Vol. 6 [2007]

The following narratives are included (SignStream database files with a total of 244 utterances, each with 2 synchronized video files—a front view and a close-up of the face):

1. Football

2. LAPD

3. Siblings

NCSLGR SignStream™ Databases, Vol. 7 [2007]

The following narratives are included (SignStream database files with a total of 151 utterances, each with 3 synchronized video files—a front view, a side view, and a close-up of the face):

1. Roadtrip 1

2. Roadtrip 2

3. Scary story

More detailed information about the contents of these data sets, including counts of the numbers of signs and tokens will soon be available online from .

Appendix B: Handshapes
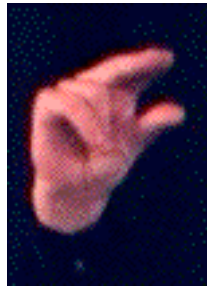
Here the handshape names we use are listed, and the handshapes are illustrated.
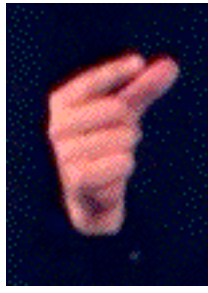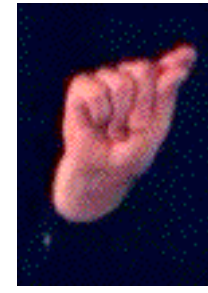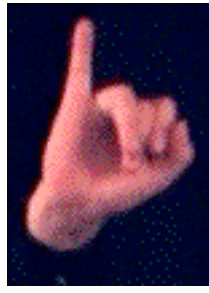
The term 'bent' is used to indicate flexion at the base joint. The term 'curved' is used systematically when there is flexion at non-base joints, following, e.g., Crasborn and van der Kooij [8]. Handshapes in which the selected fingers are together are listed above the corresponding handshapes in which the selected fingers are spread.
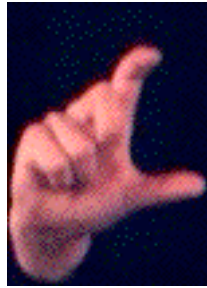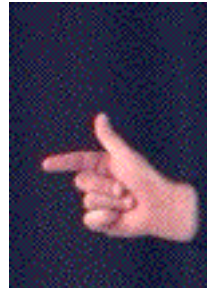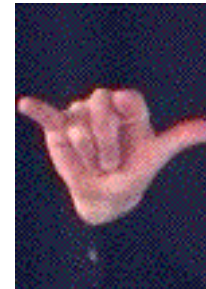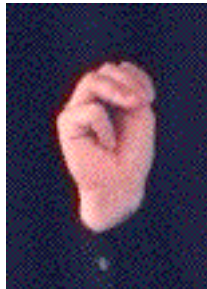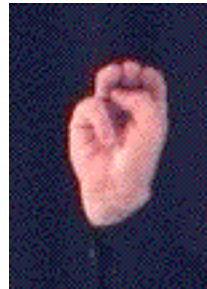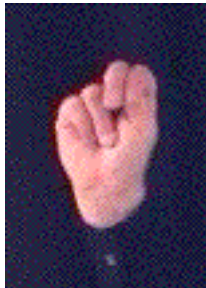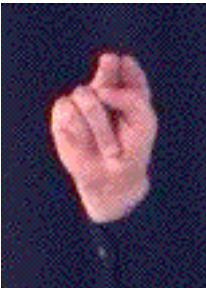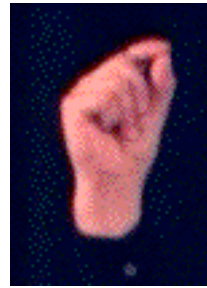
Handshapes named in terms of letters used in fingerspelling are written with capital letters. Hyphens are used with modifiers.

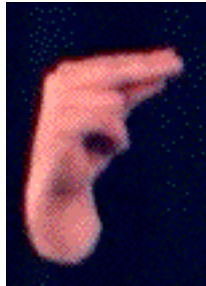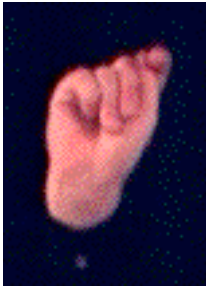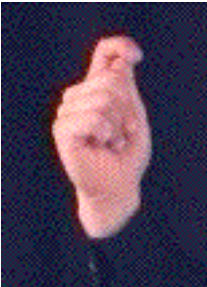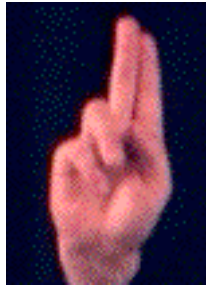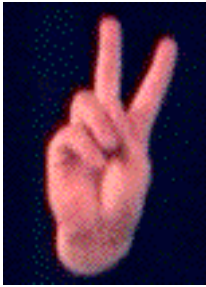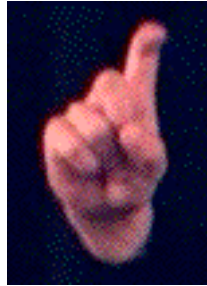The term 'open' refers to the thumb of the handshape being extended. [5]
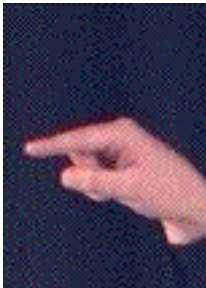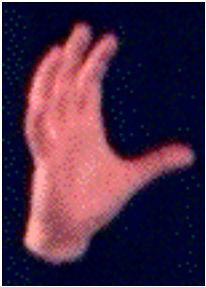
In some cases, a conventional name is used in place of the more descriptive label (e.g., "horns").
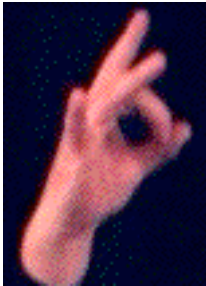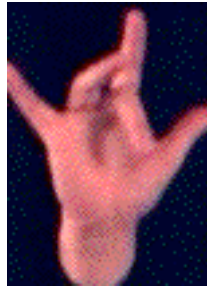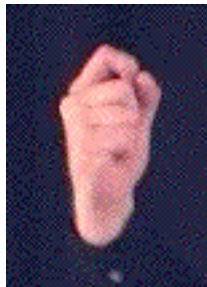
A	**B**	**crvd-B**	**crvd-sprd-B**	**B-xd**
flat-B	**B-L**	**bent-B**	**bent-B-L**	**C**
sml-C/3	**lrg-C/3**	**flat-C**	**tight-C**	**tight-C/2**

C-L	**crvd-flat-B**	**D**	**E**	**loose-E**
alt-M	**alt-N**	**F**	**cocked-F**	**open-F**
flat-F	**G**	**flat-G**	**alt-G**	**I**

K	**alt-P**	**L**	**crvd-L**	**bent-L**
L-X	**I-L-Y**	**bent-I-L-Y**	**M**	**bent-M**
full-M	**N**	**bent-N**	**O**	**baby-O**

flat-O	**flat-O/2**	**R**	**S**	**T**
X-over-thumb	**U**	**bent-U**	**crvd-U**	**V**
crvd-V	**W**	**crvd-W**	**X**	**Y**

1	**bent-1**	**Horns**	**O/2-Horns**	**bent-Horns**
3	**U-L**	**crvd-3**	**4**	**5**
crvd-5	**5-C**	**5-C-tt**	**5-C-L**	**6**

7	**8**	**cocked-8**	**open-8**	**25**
9	**open-9**	**10**	**fanned-flat-O**	**cocked-S**
cocked-U				

Appendix C: SignStream™ XML DTD

Note: Information about field and value names and labels, as well as the database export text file format, is contained in the appendices of [21].

Contained here are the XML Document Type Definitions (DTD's).

```
<?xml version="1.0"?>

<!DOCTYPE SIGNSTREAM-DATABASE [
  <!ELEMENT DISTRIBUTOR (#PCDATA)>
  <!ELEMENT AUTHOR   (#PCDATA)>
  <!ELEMENT CITATION (#PCDATA)>
  <!ELEMENT NOTES (#PCDATA)>
  <!ELEMENT PARTICIPANTS  (PARTICIPANT+)>
  <!ELEMENT CODING-SCHEME (FIELD+)>
  <!ELEMENT MEDIA-FILES    (MEDIA-FILE+)>
  <!ELEMENT UTTERANCES     (UTTERANCE+)>
]>

<!ATTLIST SIGNSTREAM-DATABASE
                         SIGNSTREAM-VERSION  CDATA  #REQUIRED
                         SOURCE CDATA  #REQUIRED
                         DATABASE-VERSION CDATA  #REQUIRED>


<!ELEMENT PARTICIPANT (BACKGROUND)>
<!ATTLIST PARTICIPANT
                         ID ID #REQUIRED
                         NAME CDATA  #REQUIRED
                         LABEL CDATA #IMPLIED
                         AGE CDATA #IMPLIED
                         GENDER (male/female)  #IMPLIED
                         LANGUAGE CDATA #IMPLIED
                         COMMENTS CDATA #IMPLIED
                         PARENTS CDATA #IMPLIED>
<!ELEMENT BACKGROUND (#PCDATA)>


<!ELEMENT FIELD(VALUE+)>
<!ATTLIST FIELD
                         ID ID #REQUIRED
                         NAME CDATA  #REQUIRED
                         LABEL CDATA #IMPLIED
                         COLOR CDATA #IMPLIED
                         CONSTRAINT CDATA #IMPLIED
                         PREFIX CDATA #IMPLIED>

<!ATTLIST VALUE
                         ID ID #REQUIRED
                         NAME CDATA  #REQUIRED
                         LABEL CDATA #IMPLIED
                         COLOR CDATA #IMPLIED>
```

```
<!ATTLIST MEDIA-FILE
                            ID ID #REQUIRED
                            LEGACY-PATH CDATA  #REQUIRED
    >


    <!ELEMENT UTTERANCE(NOTES, MEDIA-REF+, SEGMENT+)>
    <!ATTLIST UTTERANCE
                            ID ID #REQUIRED
                            EXCERPT CDATA  #REQUIRED
                            S CDATA  #REQUIRED
                            E CDATA  #REQUIRED
    >


    <!ELEMENT NOTES CDATA>

    <!ATTLIST MEDIA-REF
                            ID IDREF #REQUIRED
    >


    <!ELEMENT SEGMENT(TRACK+)>
    <!ATTLIST SEGMENT
                            PARTICIPANT-ID IDREF #REQUIRED
                            PRIMARY (true|false) #IMPLIED
    >


    <!ELEMENT TRACK(A+)>
    <!ATTLIST TRACK
                            FID IDREF #REQUIRED
    >


    <!ATTLIST A
                            S CDATA  #REQUIRED
                            E CDATA  #REQUIRED
                            VID IDREF #REQUIRED
    >
```

Appendix D: References

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[10] ---. 2007. Roadtrip 2 (version 1.0). *NCSLGR SignStream™ Databases Vol. 7*; distributed by C. Neidle for the American Sign Language Linguistic Research Project, Boston University, Boston, MA

[11] ---. 2007. Scary story (version 1.0). *NCSLGR SignStream™ Databases Vol. 7*; distributed by C. Neidle for the American Sign Language Linguistic Research Project, Boston University, Boston, MA

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