



SL-REDU GSL: A LARGE GREEK SIGN LANGUAGE RECOGNITION CORPUS

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Overview

Motivation:

- ✓ Present a large multi-signer video corpus for the Greek Sign Language (GSL).
- ✓ Suitable for the development and evaluation of GSL recognition (GSLR) algorithms.
- ✓ Collected as part of the "SL-ReDu" project [1]:
 - GSLR technologies supporting the standardized teaching of GSL as 2nd language.
 - Automates the process of student self-monitoring and assessment.
- ✓ Need for improving the field of GSL recognition, alignment, and translation.

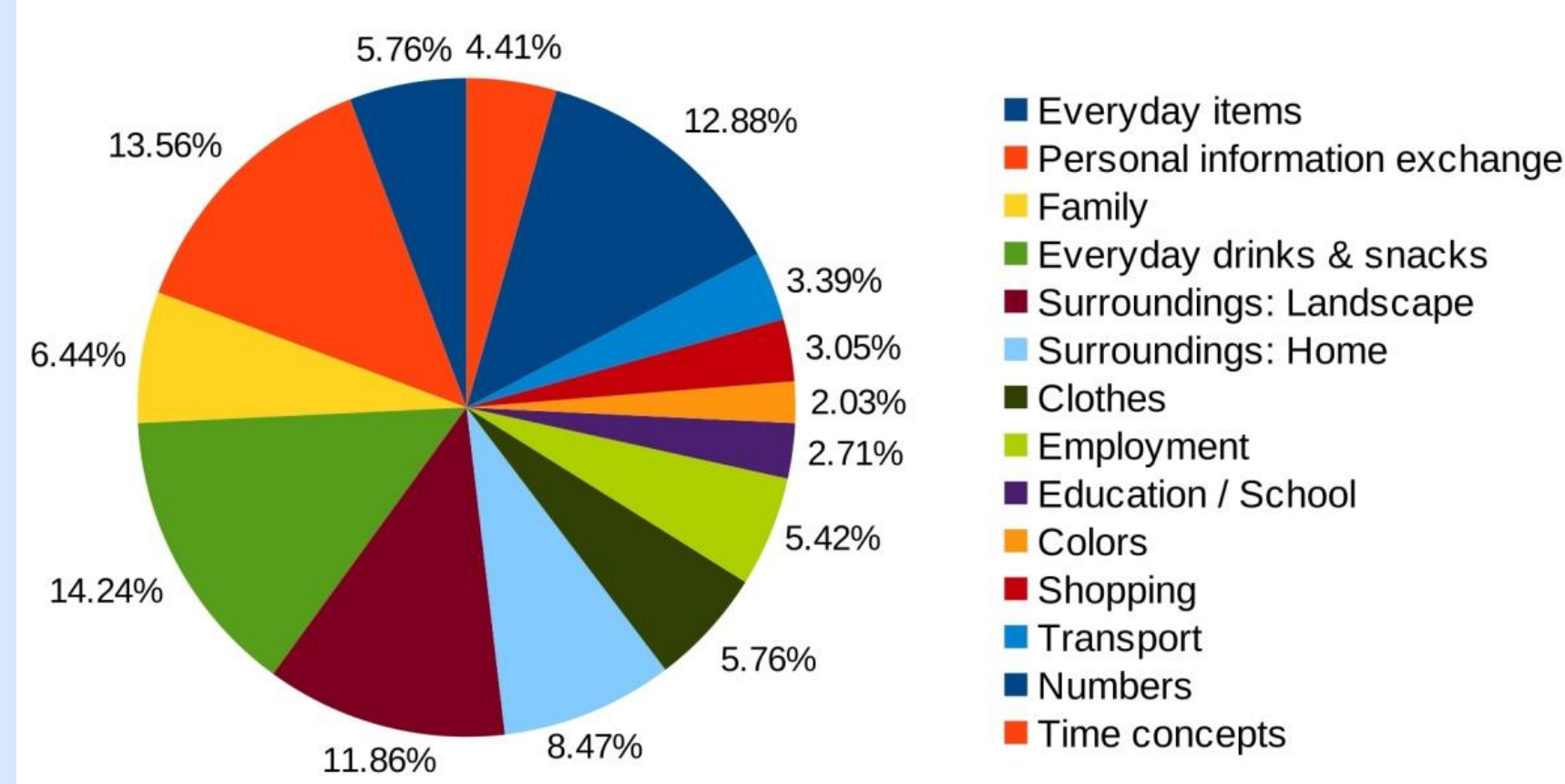
Challenges:

- ✓ Available GSL video data → ITI-GSL dataset [2] and Polytropon parallel corpus [3].
- ✓ Educational content for the SL-ReDu is not sufficiently covered in existing databases.

SL-ReDu GSL corpus:

- ✓ An extensive RGB+D video collection of 21 informants with a duration of 36 hours.
- ✓ Recorded under studio conditions.
- ✓ Consists of: isolated signs, continuous signing, and fingerspelling of words.
- ✓ Publicly available at <https://www.sl-redu.e-ce.uth.gr/corpus>.

SL-ReDu Corpus Content



Phrase Types	Examples (annotation/translation)
Affirmative	IX3 APPLE WANT He/she wants
Interrogative	MONEY HAVE IX2 Do you have money?
Negative	IX3 SIBLINGS HAVE He/she doesn't have siblings
Noun phrase	WATER cl-vol: thick a lot of water
Verb phrase	1GIVE3 give-to-multiple-recipients
Numerals	IX1 SIBLINGS HAVE THREE I have three siblings
Quantifiers	WATER cl-vol: thin a little water
Qualifiers	JUMPER cl-vol: thick a thick jumper
Classifiers	PLATE cl-SASS: round a round plate
Inflection for person	IX3 CYCLE CANNOT He/she can't cycle
Inflection for number	THREE-HOURS three-hours
Topic-comment	IX3 HAVE-A-WALK LIKE NOT He/she doesn't like going-for-walks
Agent-patient	2ASK3a,3b, 3c You ask them
Expression	IX2 PAY Have you paid?
Shoulders	IX3 COFFEE LIKE Does he like coffee?

Content derives from:

- ✓ The definition of the language material for levels A0-A1 of the Common European Framework for Languages for GSL as L2 [4,5].

Corpus is organized in:

- ✓ Single word units:
 - 369 unique lexical units.
 - Semantic and structural organization criteria: morphological and articulatory features.
 - SL-specific lexical categories for communication at this level.
- ✓ GSL phrases:
 - 799 phrases.
 - Annotation and translation into spoken Greek.
 - 7 main phrase types.
- ✓ Fingerspelling data:
 - 24 Greek alphabet letters.
 - 926 GSL alphabet fingerspelled words of 3-6 letters.

SL-ReDu Corpus Creation (I)

Recording protocol:

- ✓ Elicitation material for lexical units and phrases is video-based.
- ✓ Lexical elicitation material extracted from Polytropon corpus, and the Dicta-Sign dataset [6].
- ✓ Additional captures recorded for lexical units and phrases.
- ✓ Elicitation for fingerspelling is text-based.

Developed recruitment strategy:

- ✓ A total of 21 informants.
- ✓ Signers with early GSL acquisition as first language, and bilingual GSL signers.
- ✓ Both genders → 11 females and 10 males.
- ✓ Ages between 19 and 52 years old.
- ✓ Subjects signed an informed consent form on handling personal information.

Acquired Data:

- ✓ Isolated signs:
 - 21 signers articulated 369 signs 3 consecutive times.
 - 1 signer performed only 184 isolated signs.
- ✓ Continuous signing:
 - 799 phrases were divided into 3 different groups.
 - 20 informants → only one group once.
 - 1 subject → 136 phrases.
 - 1 signer → all the 799 phrases.

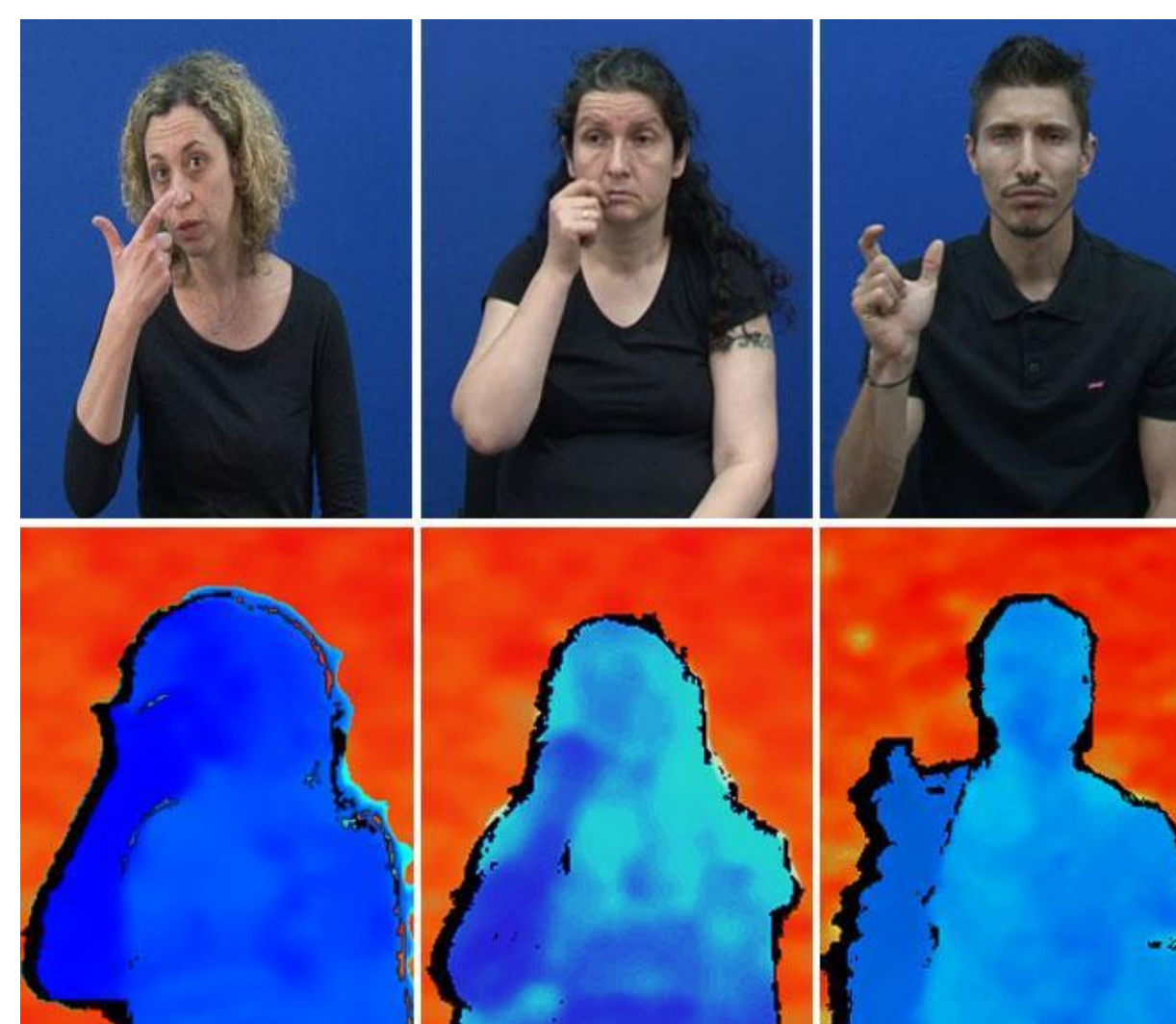
Fingerspelling:

- Each informant → once the 24 GSL alphabet letters in isolation.
- Each informant → a set of 50 fingerspelled words composed of 3-6 letters.
- Each signer → each alphabet letter at least 4 times in total.



Studio Setup for Data Collection:

- ✓ Studio video recordings → Institute for Language and Speech Processing (ILSP).
- ✓ Studio setup involves two cameras:
 - Sony HVR-Z7N camera: HD video capture → 1920×1080-pixel resolution / 60 Hz (interlaced).
 - Intel RealSense D435i RGB+D: Depth stream → 848×480-pixel resolution with 16-bit / 30 Hz.



SL-ReDu Corpus Creation (II)

- ✓ Videos involve informants in both sitting and standing positions.
- ✓ Studio recording process:
 - Automated signing video data collection.
 - Monitor projecting both messages and elicitation material.
 - Synchronization of cameras via multi-threading.
 - 2 different threads: execution starts at the same time and lasts for the same time duration.
 - Video filenames involve the signed content, signer id, sign repetition, and video type.



SL-ReDu Corpus Overview

SL-ReDu GSL recognition datasets statistics.

Task	Signers	Unique content	Vocab. size	Avg. units /video	Videos	Frames	Duration (hrs:mins)
Isolated	21	369 signs	369 signs	1 sign	22,632	2,715,840	25:15
Continuous	21	799 sentences	408 glosses	2.86 glosses	5,930	889,500	8:24
Fingerspelling	21	950 words	24 letters	4.55 letters	1,554	234,360	2:17
Total	21	—	—	—	30,116	3,839,700	35:56

Summary of large-scale SLR datasets (isolated signing (Iso.), continuous signing (Con.), and fingerspelling (Fing.)).

Dataset	Type	Language	Signers	Vocabulary	Videos	Duration (hrs:min)	Modalities
Signum [9]	Iso.	German	25	455	11,375	8:26	RGB
MSASL [10]	Iso.	English	222	1,000	25,513	24:39	RGB
Polytropon [4]	Iso.	Greek	1	2,703	3,517	8:19	RGB+D
ITI-GSL [3]	Iso.	Greek	7	310	40,785	6:26	RGB+D
AUTSL [11]	Iso.	Turkish	43	226	38,336	21:00	RGB+D
BOBSL [12]	Iso.	English	39	2,281	1,940	1,467:--	RGB
CSL [13]	Iso.	Chinese	50	500	125,000	67:45	RGB+D
Phoenix [14]	Con.	German	9	1,231	6,841	10:43	RGB
Phoenix-T [15]	Con.	German	9	1,231	8,257	10:32	RGB
CSL [16]	Con.	Chinese	50	178	25,000	100+:--	RGB+D
ITI-GSL [3]	Con.	Greek	7	310	10,295	9:35	RGB+D
Signum [9]	Con.	German	25	780	19,500	55:18	RGB
ChicagoFSWild [17]	Fing.	English	160	26	7,304	1:47	RGB
ChicagoFSWild+ [18]	Fing.	English	260	26	55,232	--	RGB
SL-ReDu	Iso.	Greek	21	369	22,632	25:15	RGB+D
	Con.	Greek	21	408	5,930	8:24	RGB+D
	Fing.	Greek	21	24	1,554	2:17	RGB+D

Conclusions

- ✓ Introduced the SL-ReDu GSL corpus:
 - ✓ An extensive RGB+D video collection for GSL recognition.
 - ✓ Covers the area of language education along with some general content.
 - ✓ Collected as part of the SL-ReDu project:
 - Focuses on the education use-case of systematic teaching of GSL as second language.
 - ✓ Contains 3 distinct RGB+D video subsets:
 - Isolated signs; continuous signing; and fingerspelling.
- ✓ Dataset is made publicly available.
- ✓ Immediate plans:
 - ✓ Release of experimental results of baseline SLR models on it.

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- [*] See paper for the table citations.