

Data Gloves in Sign Language Research

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Why data gloves?

- high temporal resolution, ca. 100 Hz
- high spatial resolution (mm, $\frac{1}{2}$ degree)
- sensors directly at points of interest:
 - RF wrist position / direction tracker
 - resistive bend sensor strips at various joints
- 3d coordinates (almost) directly available

Why not data gloves?

- expensive hardware and software
 - only one glove available
 - use own soft: well-defined RS232 protocol
- subject cannot move around freely
 - limited range but no visibility issues
- signing while wearing a glove “feels odd”
 - could wear a dummy glove on the other hand

How does it work?

- glove sensors
measure angles
 - wrist, thumb, fingers
- 3d tracker at wrist
 - position, orientation
 - 1.5m hemisphere
from reference “box”



Behind the scenes

- tracker electronics box (cable to PC: RS232)
 - embedded 286 PC
 - provides coordinates and angles directly
- glove electronics box (also RS232)
 - 8 bit A/D conversion of all sensors, timebase
- software library (Win32 C++, older also Unix)
 - unit conversion, kinematic modelling...

Not behind the scenes

- Dictionary example: Gesture for “rabbit”

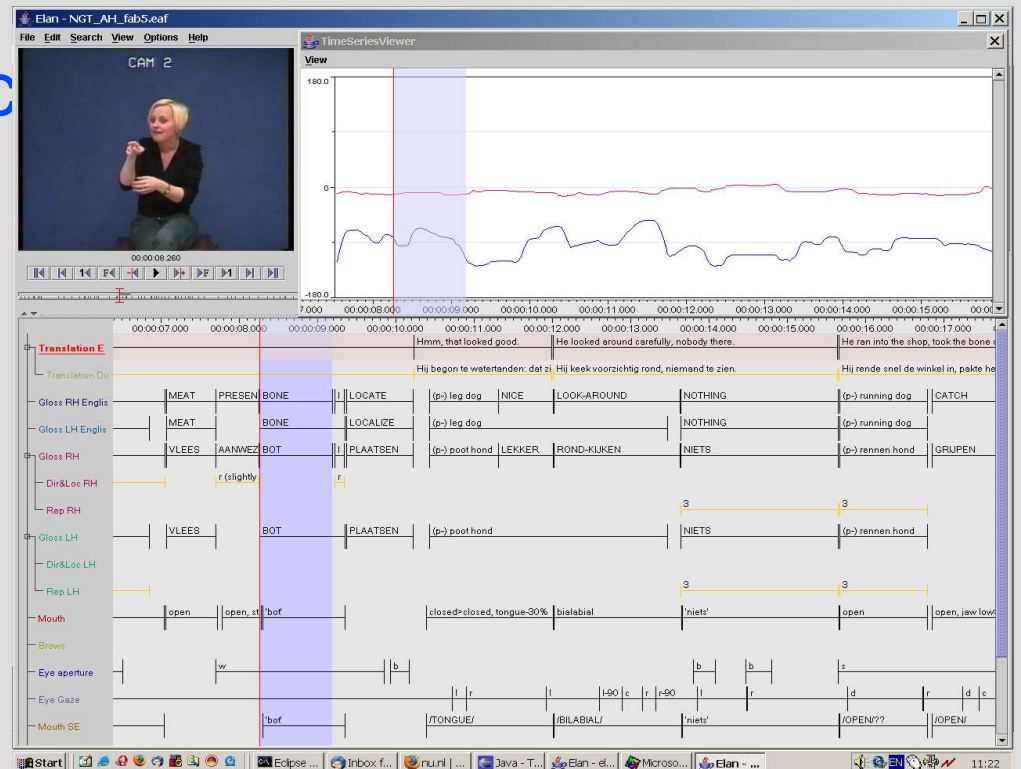


Recording sign language

- GloveGUI recording tool (by EA...)
 - real-time 2d wireframe feedback display
 - logs to human readable plain text file
- video (not via computer)
 - DV, converted to MPEG2 or MPEG4
- low-tech, high-quality synchronization
 - film LED on glove and toggle its state

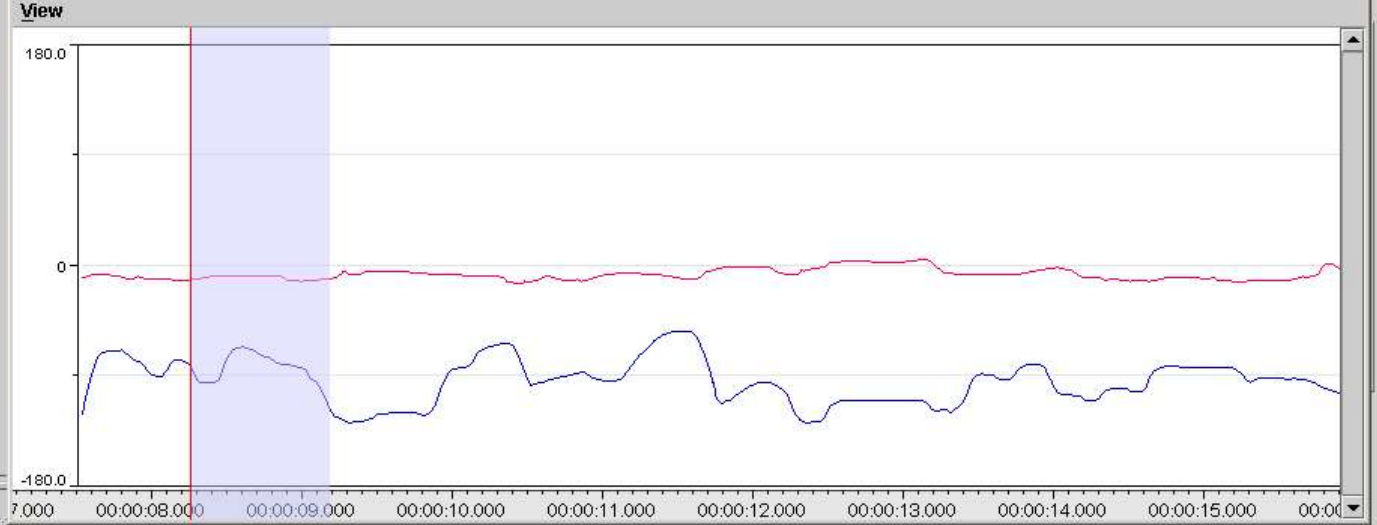
Annotation with ELAN

- synchronized views
 - video, audio, generic time series data...
- annotate tiers
 - hierarchy of tiers
 - synchronized view
- it's free: mpi.nl/tools/





00:00:08.260
Media playback controls: stop, previous, play, next, fast forward, full screen.



	00:00:07.000	00:00:08.000	00:00:09.000	00:00:10.000	00:00:11.000	00:00:12.000	00:00:13.000	00:00:14.000	00:00:15.000	00:00:16.000	00:00:17.000							
Translation E					Hmm, that looked good.	He looked around carefully, nobody there.				He ran into the shop, took the bone								
Translation Du					Hij begon te watertanden: dat zi	Hij keek voorzichtig rond, niemand te zien.				Hij rende snel de winkel in, pakte he								
Gloss RH Englis		MEAT	PRESEN	BONE	LOCATE	(p-) leg dog	NICE	LOOK-AROUND	NOTHING		(p-) running dog	CATCH						
Gloss LH Englis		MEAT		BONE	LOCALIZE	(p-) leg dog			NOTHING		(p-) running dog							
Gloss RH		VLEES	AANWEZ	BOT	PLAATSEN	(p-) poot hond	LEKKER	ROND-KIJKEN	NIETS		(p-) rennen hond	GRUIPEN						
Dir&Loc RH			r (slightly		r													
Rep RH								3		3								
Gloss LH		VLEES		BOT	PLAATSEN	(p-) poot hond			NIETS		(p-) rennen hond							
Dir&Loc LH																		
Rep LH								3		3								
Mouth		open	open, st	'bof		closed>closed, tongue-30%	bialabial		'niets'		open	open, jaw low						
Brows																		
Eye aperture			w			b	b			s								
Eye Gaze						l	r	l	l-90	c	r	r-90	l	r	d	r	d	c
Mouth SE				'bof		/TONGUE/		/BILABIAL/		'niets'		/OPEN??		/OPEN/				

More ELAN features for gloves

- versatile time-series display
 - separate or combined Y coordinate systems
 - do some basic analysis (min/max, ...)
- derived functions (coordinates, angles)
 - speed, acceleration, jolt
- adjustable time alignment between sources
 - align glove/tracker log with video recording

Brought to you by...

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 - GloveGUI development, hardware happiness