

# TYPANNOT

## a new glyptic system to annotate handshapes in any sign languages

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# Representing Sign Languages

...

Mimographie (1825)

Stokoe Notation (1960)

SignWriting (1974)

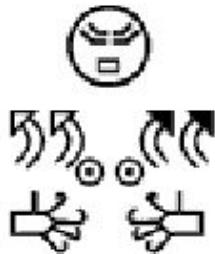
SignFont (1989)

HamNoSys (1989)

D'Sign (1995)

Si5s (2010)

...



# Objectives of the transcription system

The screenshot displays the Elan software interface for video annotation. At the top, the menu bar includes File, Edit, Annotation, Tier-Type, Search, View, Options, Window, Help, and Elan - HSG1.earf. The main window shows two men signing against a blue background. The timeline at the bottom indicates a selection from 00:00:17.370 to 00:00:17.470. The right side features a grid view of annotations:

Nr	Annotation	Begin Time	End Time	Duration
1	SAME	00:00:15.140	00:00:15.330	00:00:00.190
2	SCOTLAND	00:00:15.330	00:00:15.630	00:00:00.300
3	HOLD-FLAG	00:00:17.040	00:00:17.270	00:00:00.230
4	PTloc	00:00:17.270	00:00:17.590	00:00:00.320
5	G	00:00:17.590	00:00:17.890	00:00:00.300
6	PEOPLE-LOOK	00:00:19.380	00:00:19.640	00:00:00.260
7	NORTH	00:00:19.650	00:00:19.860	00:00:00.210
8	IRELAND	00:00:19.870	00:00:20.310	00:00:00.440
9	SAME	00:00:20.320	00:00:20.550	00:00:00.230
10	PEOPLE-LOOK	00:00:20.550	00:00:20.930	00:00:00.380
11	PTpro1	00:00:24.420	00:00:24.610	00:00:00.190

The bottom section shows a timeline from 00:00:16.000 to 00:00:29.000 with various annotation tracks. The tracks include:

- RH ID gloss (24)
- LH ID gloss (24)
- Dependent variable (10)
- 1-handed/2-handed (10)
- Grammatical func (10)
- HS preceding target (11)
- HS following target (9)
- Genre of text which (10)
- Summary (10)
- Social (10)

Annotations are represented by vertical lines and boxes with labels like SA, PTloc, G, etc.

# Limits of existing transcription systems

Notation systems must meet 5 main criteria to make possible accurate analyses and their reading :

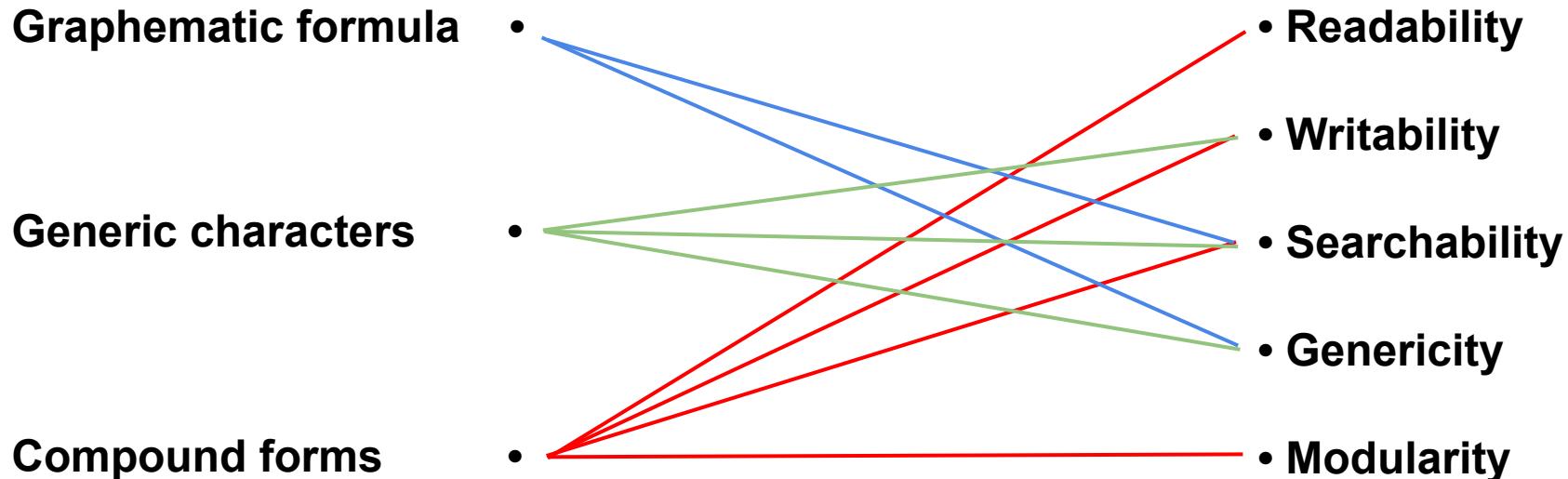
	Readability		Writability		Searchability	Genericity	Modularity
	Human	Computer	Human	Computer			

# Limits of existing transcription systems

Notation systems must meet 5 main criteria to make possible accurate analyses and their reading :

	Readability		Writability		Searchability	Genericity	Modularity
	Human	Computer	Human	Computer			
<b>SignWriting</b>							
<b>HamNoSys</b>							

# TYPANNOT uses 3 levels of representation



# Level 1: the graphematic formula

<b>Hand selection</b>	<b>Finger selection</b>	<b>Shape</b>	<b>Angle</b>	<b>Finger event</b>	<b>Thumb event</b>
Left	Index	Flat	Open	Grouped	Opposed
Right	Middle	Curved	Semi-closed	Crossed	Non-opposed
	Ring	Bent	Closed	Stacked	Contact
	Pinky			Reverse	
	Thumb				

# Level 1: the graphematic formula

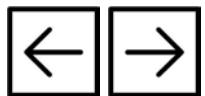


**1TOCscCO 234Fo**

- |              |                             |
|--------------|-----------------------------|
| <b>1</b>     | <b>Index</b>                |
| <b>TO</b>    | Thumb Opposed               |
| <b>Csc</b>   | Curved semi-closed          |
| <b>CO</b>    | COntact                     |
| <b>234Fo</b> | Middle Ring Pinky Flat open |

# Level 2: the generic characters

Lateralisation



Finger designation



Shape



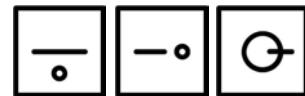
Angle



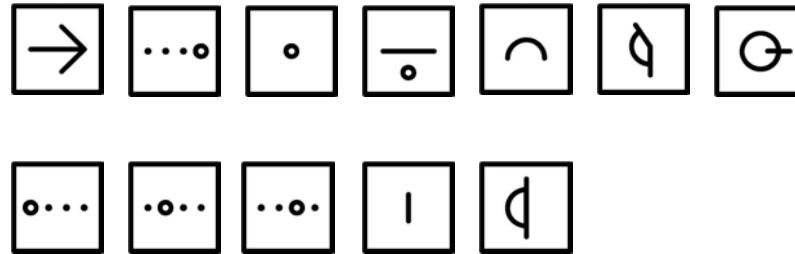
Finger event



Thumb event

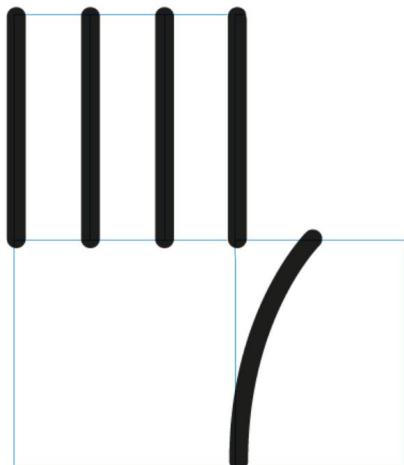


# Level 2: the generic characters



Right hand, Index, Thumb, Opposed, Curved, Semi-closed, Contact  
Middle, Ring, Pinky, Flat open

# **Level 3: the compound forms**



**flat** | i .

bent በእናት

contact - - -

thumb opposed

thumb non opposed

curved

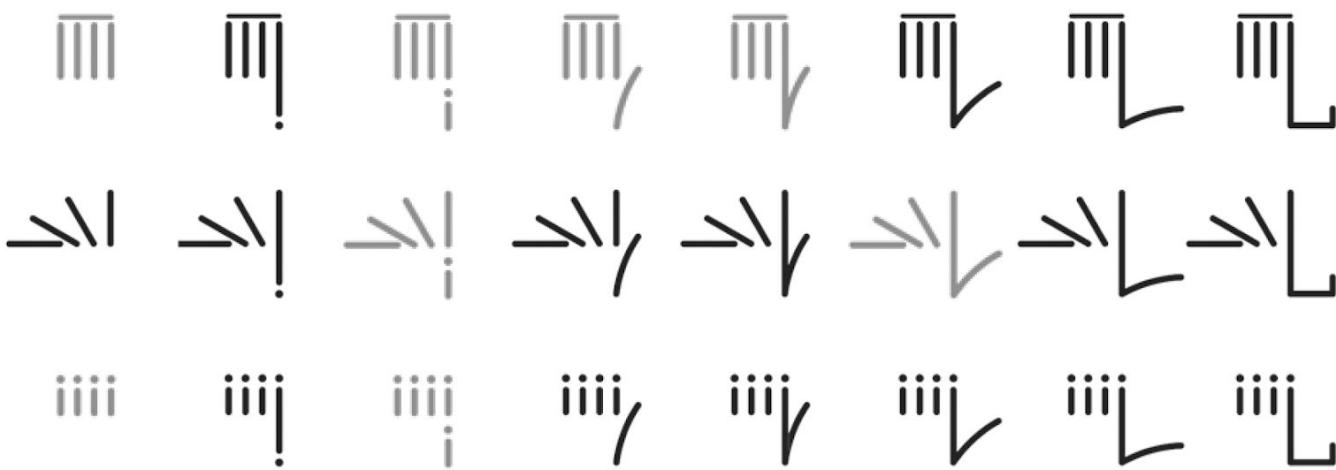
crossed | : :

grouped - - -

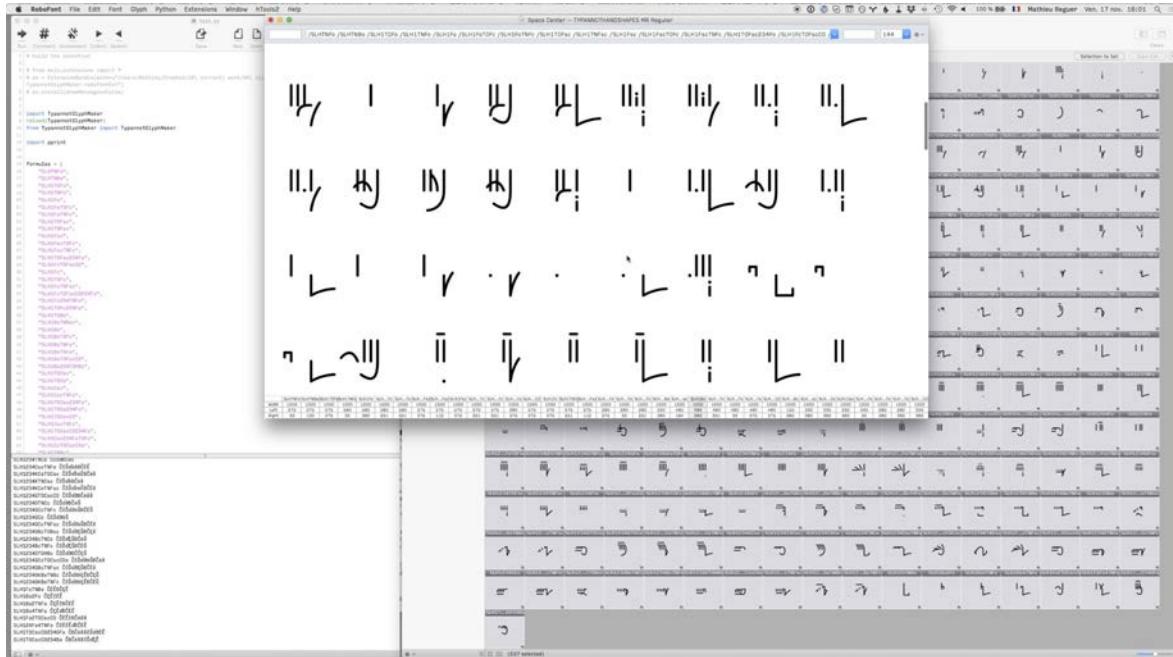
◀◀◀◀◀◀◀◀

## ה ר י ש ב ב ל ו ה ט ר ל ר / ז .

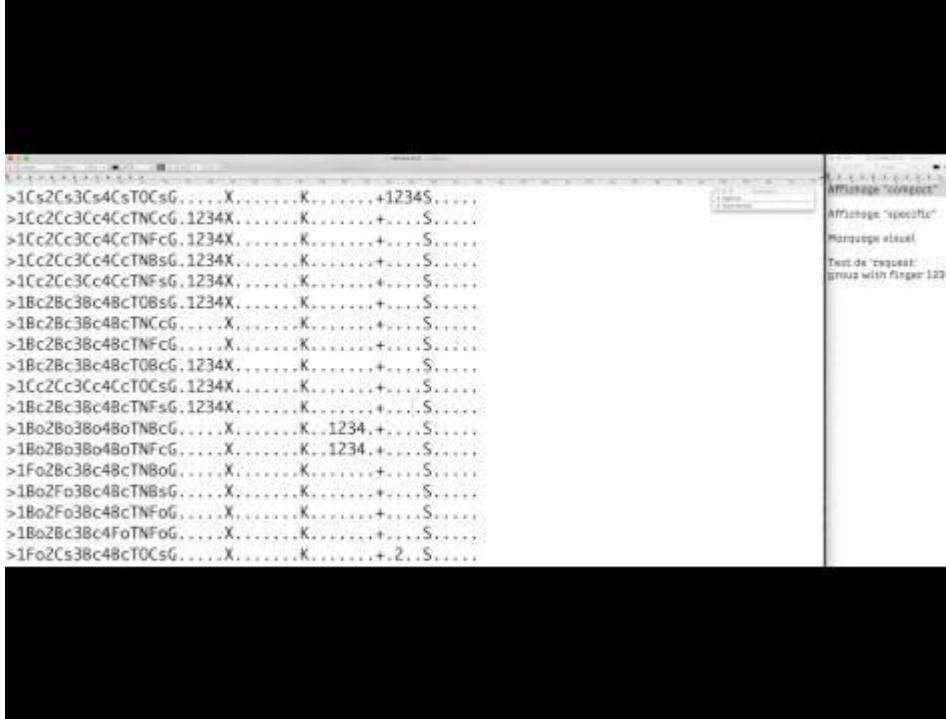
## Level 3: the compound forms



# Compound forms are generated



# Three ways to look at it



A screenshot of a software application window showing a list of musical notes and a context menu.

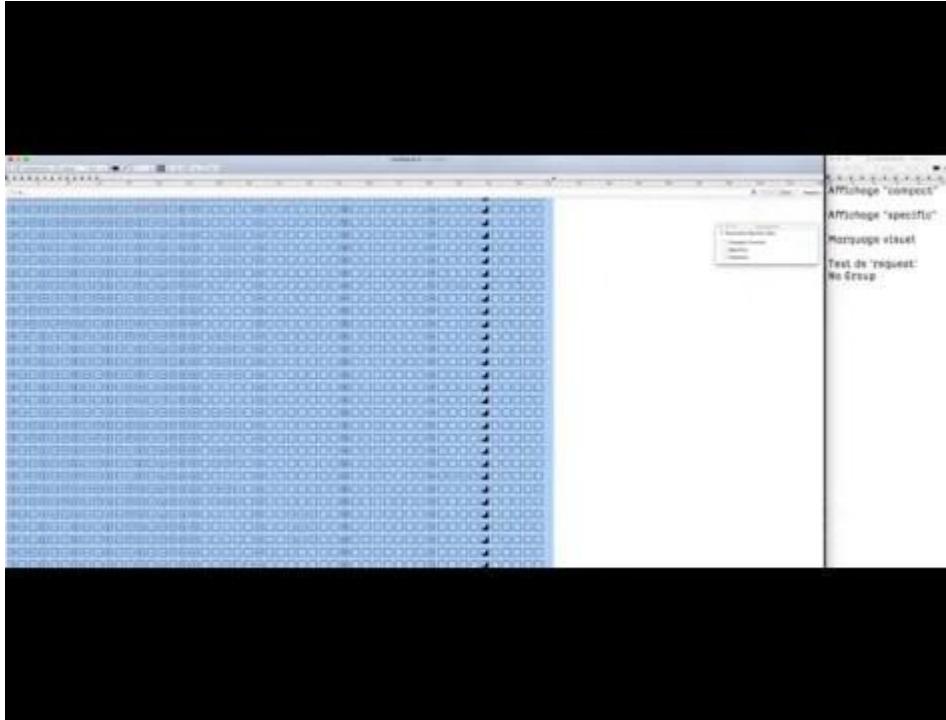
The list of notes (left side) includes:

- >1Cs2Cs3Cs4CsT0CsG.....X.....K.....+1234S.....
- >1Cc2Cc3Cc4CcTNcG.1234X.....K.....+....S.....
- >1Cc2Cc3Cc4CcTNfG.1234X.....K.....+....S.....
- >1Cc2Cc3Cc4CcTNbG.1234X.....K.....+....S.....
- >1Cc2Cc3Cc4CcTNfSg.1234X.....K.....+....S.....
- >1Bc2Bc3Bc4BcT0BsG.1234X.....K.....+....S.....
- >1Bc2Bc3Bc4BcTNcG. ....X.....K.....+....S.....
- >1Bc2Bc3Bc4BcTNfG. ....X.....K.....+....S.....
- >1Bc2Bc3Bc4BcT0Bg.1234X.....K.....+....S.....
- >1Cc2Cc3Cc4CcT0CsG.1234X.....K.....+....S.....
- >1Bc2Bc3Bc4BcTNfSg.1234X.....K.....+....S.....
- >1Bo2Bo3Bo4BoTNbcG. ....X.....K.....1234.+....S.....
- >1Bo2Bo3Bo4BoTNfG. ....X.....K.....1234.+....S.....
- >1Fo2Bo3Bo4BoTNbg. ....X.....K.....+....S.....
- >1Bo2Fo3Bo4BoTNbsG. ....X.....K.....+....S.....
- >1Bo2Fo3Bo4BoTNfog. ....X.....K.....+....S.....
- >1Bo2Bc3Bc4BoTNfog. ....X.....K.....+....S.....
- >1Bo2Cs3Bc4BoT0CsG. ....X.....K.....+....S.....

The context menu (right side) includes:

- Ampliage "couplet"
- Affichage "spécific"
- Marquage visuel
- Tout de "raport": group with finger 1234

# Complete searchability



## Input interfaces

The screenshot shows the 'PARAMETRIC SELECTOR' interface. At the top, there are tabs for HANDSHAPE, TABLE, SETTINGS, Glyphes, RDF, 3D Model, and 3D Model 2. Below the tabs, there are buttons for P, V, T and a 'PARAMETRIC SELECTOR' label. The main area is divided into sections: 'left hand' and 'right hand' under 'fingers' (grouped), 'selection' (S1, S2, S3), and 'thumb'. The 'left hand' section includes 'OPTION' (stacked, crossed, reverse) and 'SHAPE' (flat, curved, bent). The 'right hand' section includes 'OPTION' (non opposed, opposed) and 'ANGLE' (open, semi-closed, closed). The 'thumb' section includes 'OPTION' (contact) and 'SHAPE' (flat, curved, bent) along with 'ANGLE' (open, semi-closed, closed, closed inside). At the bottom left is a checkbox for 'validate with decomposed formula'. On the right, there are icons for various hand shapes, a preview image of a hand, and text fields for 'Index', 'Unicode', 'E&B', 'SL', 'FORMULE', and 'SignWriting'.

FORMULE :

Handshape TABLE SETTINGS GLYPHS 2D HS 3D Model 3D Model 2

▼ Handshapes Generics Configurations

► Loc Ini ► Movement ► Mouthing

-	-		L		/	k	i
F	F	F	F	F	F	F	
L	i	y	r	III i	t	.	y
r	III t	III L	III y	III	r	n	l
L	L	f	m	c	)	^	z
III L	III	o	g	III	o	g	
g	III o	g	III g	III o	l	l	y
III	III L	III f	III y	III	III L	III	III
F	F	F	F	F	F	F	F
III	III L	III f	l	III L	III	III	III

Index : 85  
Unicode : F0054  
E&B : 1T-;  
SL :  
SL H 1TNFo  
HamNoSys : ✓  
SignWriting :

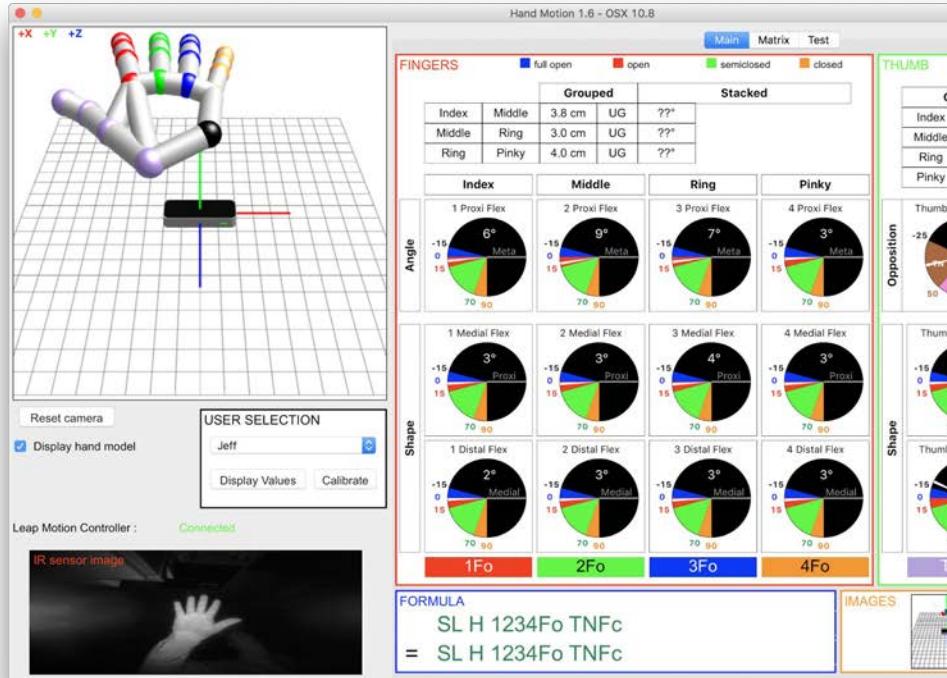


# Work in progress

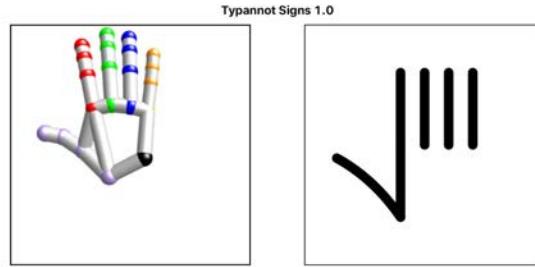
The interface is a digital tool for gesture creation. It includes a menu bar with various options like Handshape, Loc. Ini., and Mouth Action. The main area features a hand icon, a drawing of a hand, and a vertical column of icons. Below these are two rows of finger icons. At the bottom is a detailed control panel with columns for INDEX, MIDDLE, PINKY, THUMB, non opposed, flat, and open. Each column has a row of icons for action, shape, angle, and contact.

	INDEX	MIDDLE	PINKY	THUMB	non opposed	flat	open	X
action	○	×	≡	⤔	-o	-	non opposed	⤓
shape	I	Λ	Π				flat	⤒
angle	⦶	⦷	⦸				open	⤓
contact	⦿							⤒

# Gestural Interfaces



# Gestural Interfaces



R1Fo92Fo93Fo94Fo9TNFscG99999X99999K99999COT99

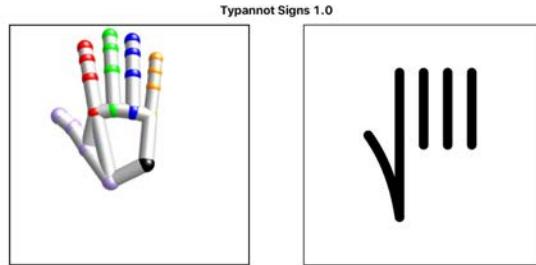
PRIMARY GENERICS



SECONDARY GENERICS



# Gestural Interfaces



R1Fo92Fo93Fo94Fo9TNFc9G99999X99999K99999COT95

PRIMARY GENERICS

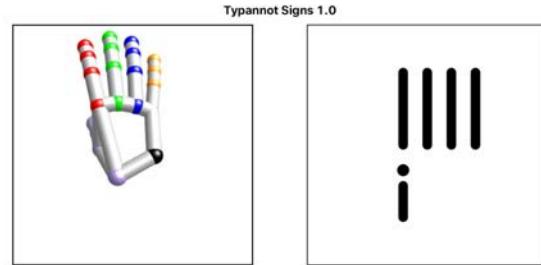


1234Fo TNFc

## SECONDARY GENERICS

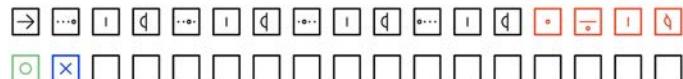


# Gestural Interfaces



R1Fo92Fo93Fo94Fo9**TOFsc**G99999X99999K99999COT99

PRIMARY GENERICS

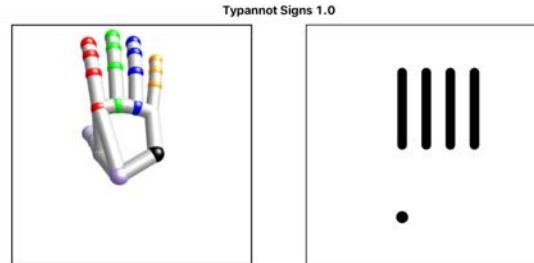


**1234Fo TOFsc**

SECONDARY GENERICS

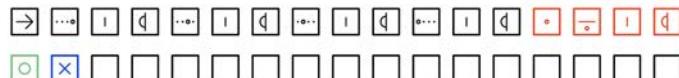


# Gestural Interfaces



R1Fo92Fo93Fo94Fo9TOFo9G99999X99999K99999COT9:

## PRIMARY GENERICS

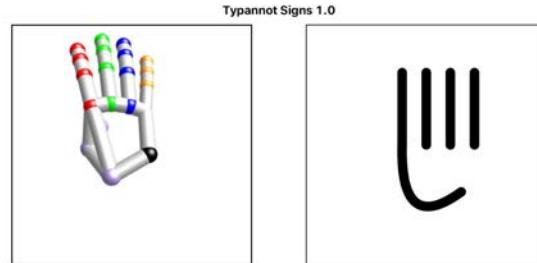


1234Fo TOFo

## SECONDARY GENERICS

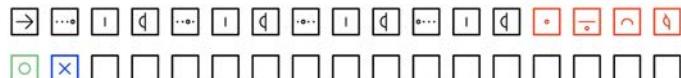


# Gestural Interfaces



R1Fo92Fo93Fo94Fo9TOCscG99999X99999K99999COT9:

PRIMARY GENERICS



1234Fo TOCsc

SECONDARY GENERICS



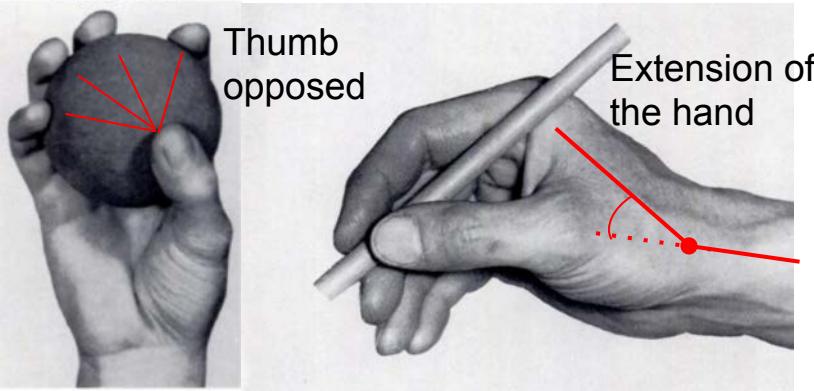
# Praxic gestures, symbolic gestures



Thumb non  
opposed

## Power grip

- Thumb non opposed



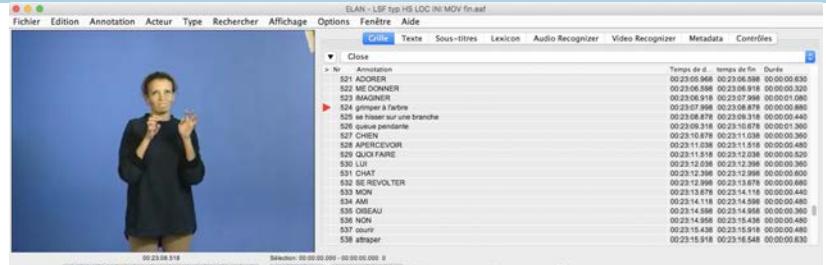
Thumb  
opposed

## Precision grip

- Thumb opposed
- Extension of the hand

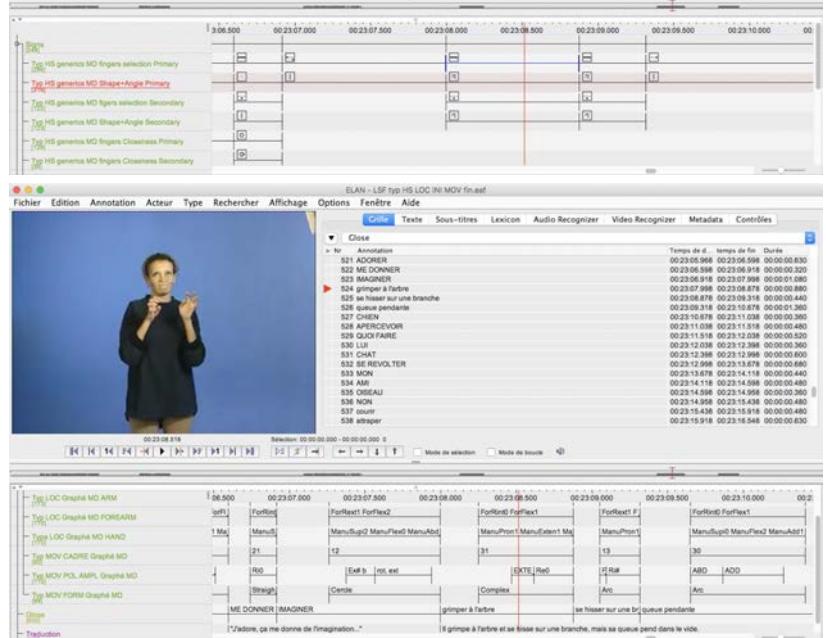
FIG. 2  
A precision grip posture.

# Research using Typannot

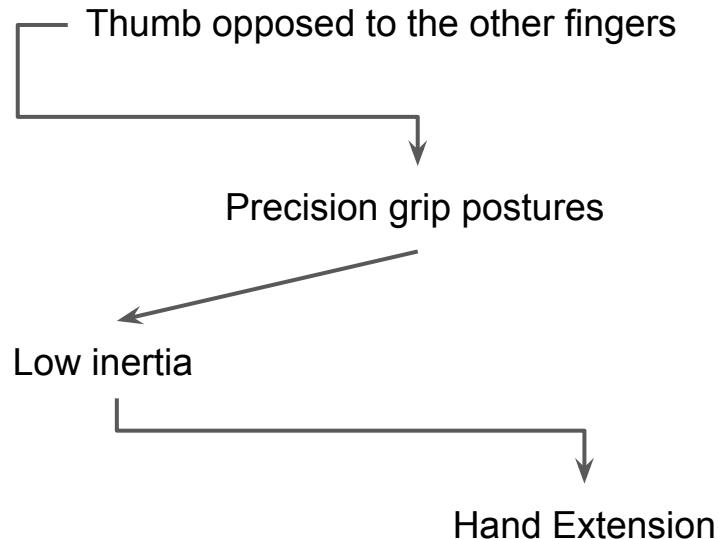
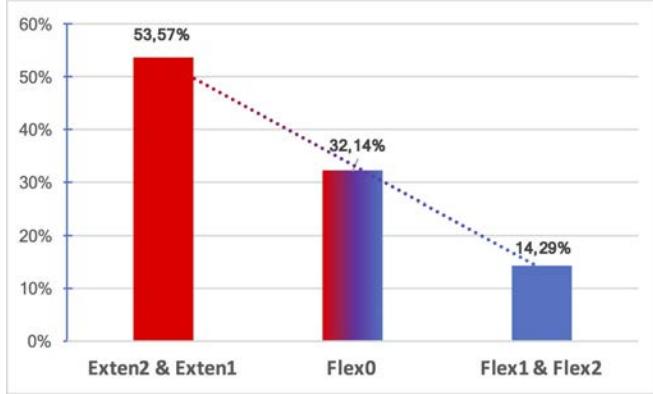


Transcription according to

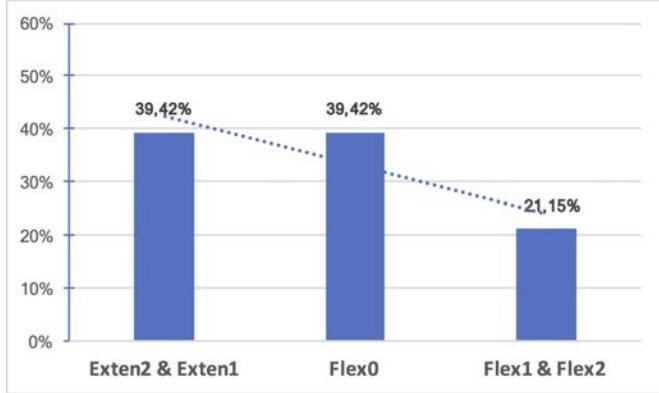
- the type font (Handshapes)
- the graphemic formula (LOC and MOV)



# Some results: Praxic gestures/symbolic gestures



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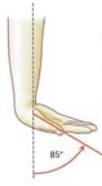


Thumb **NON** opposed to the other fingers

Power grip postures

Strong inertia

**Less** Hand Extension, more intermediate locations



# Perspectives

## HANDSHAPES (2018)

- The gestural interface,
- The virtual keyboard (graphical and keyboard interfaces)
- Transcription of ½ hour of LSColin (5000 signs)

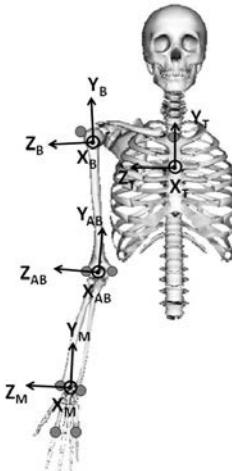
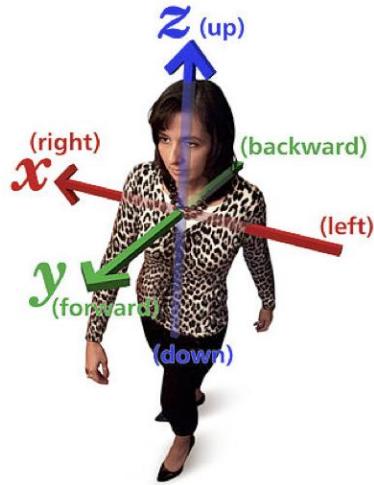
## LOCINI (2019)

- A set of the generic characters
- A set of compound forms
- A minimal gestural interface
- Transcription of ½ hour of LSColin

## MOUTH ACTION (2019)

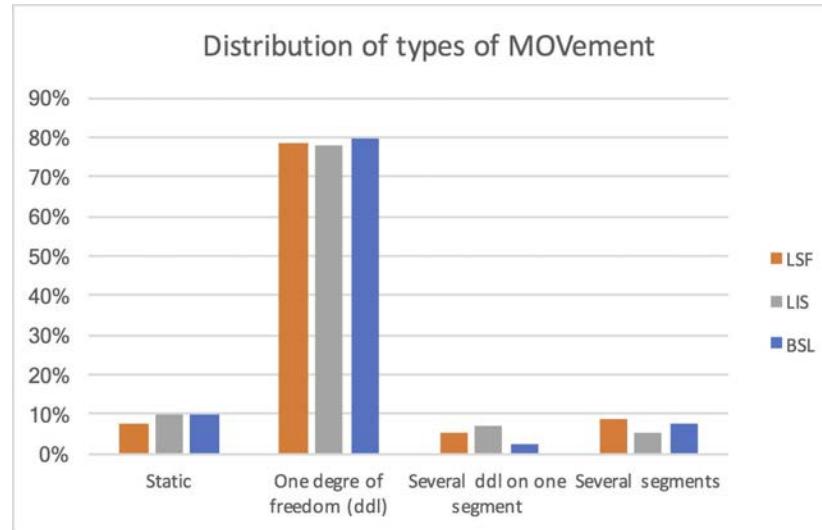
- A set of graphematic formula
- A set of the generic characters
- A set of compound forms
- Transcription of 10 minutes of LSColin (FSL corpus)

# Typannot movement: a transcription system based on intrinsic frame of references (**Domi**)



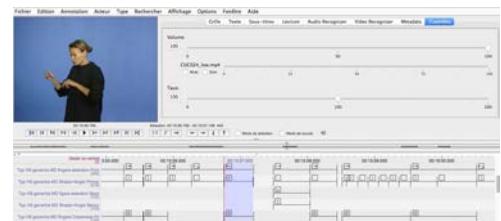
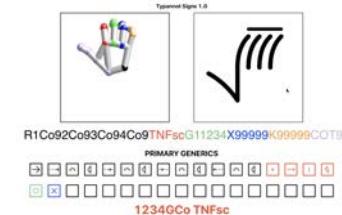
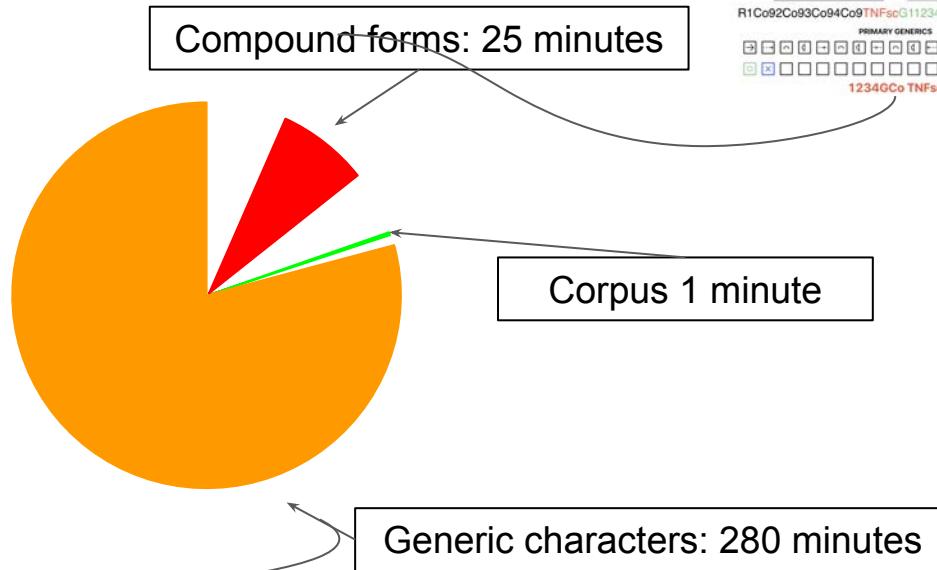
# Some results: Motor schemas and motor control

Hyp: The movement has a simple motor schema to minimize the motor control during the sign.

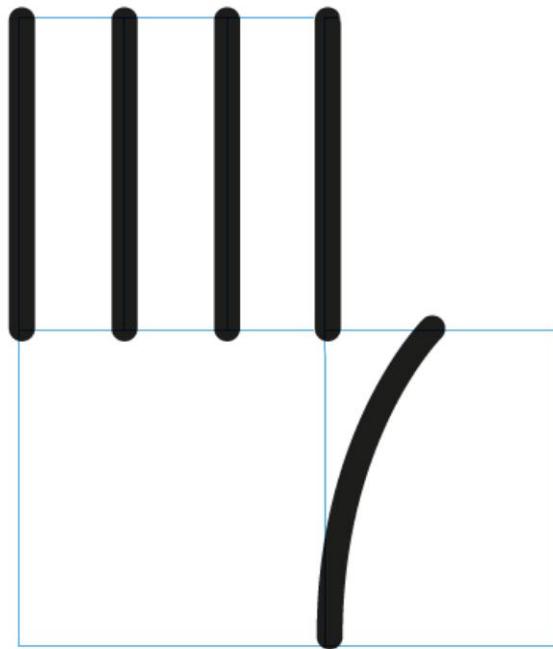
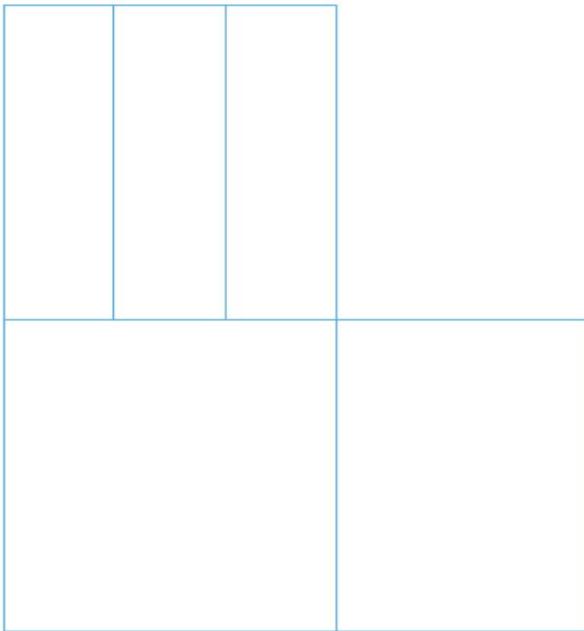


# Transcription time in Elan

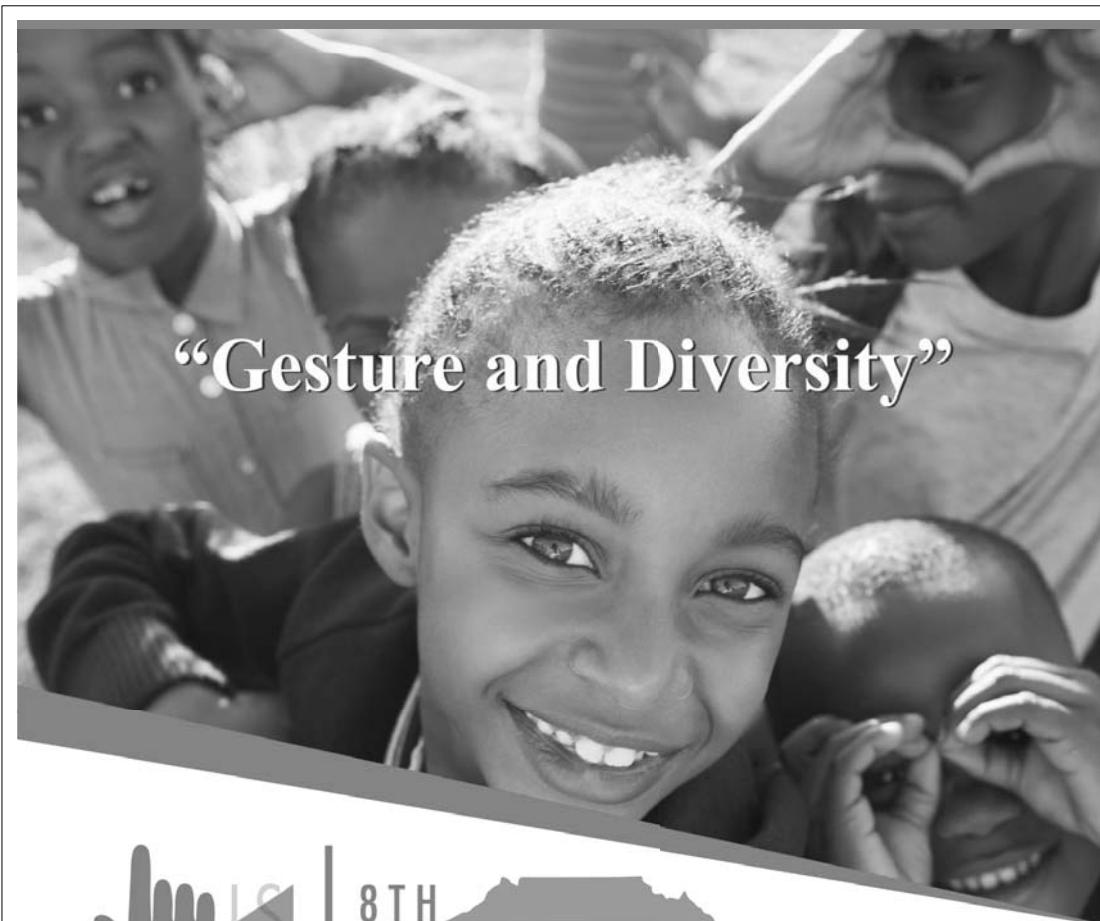
Some clues of the ratio between a corpus and the transcription ([Domi](#))



## Level 3: the compound forms



# **Level 3: the compound forms**



# “Gesture and Diversity”



## 8TH INTERNATIONAL CONFERENCE

CAPE TOWN, SOUTH AFRICA | 4 - 8 JULY 2018



## Book of Abstracts

### TYPANNOT, a new glyptic system to annotate handshapes in any sign languages

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There are two main systems of transcription for sign languages (SL): SignWriting [1,2] and HamNoSys [3]. Each of them have been designed for different yet complementary purposes. The first system is oriented towards communication, focusing on readability and using a strong logographic approach. The second one is oriented towards analysis, focusing on searchability and using a strong phonographic approach. Both transcribe the form of signs with a symbolic glyptic system, instead of glosses [4] using vocal glyptic systems. Each of them can be appreciated in their own use and purpose but this separation reveals the incapacity so far to combine both qualities in one system: phonographic searchability and logographic readability.

Our aim is to solve this semiotic dichotomy by designing a new highly modular system that can answer the needs of all existing 142 SL [5] around the world (and virtually any SL) to transcribe the handshapes. The development and the use of this system relies on a new graphematic formula and modern typographic technologies such as OpenType and Robofont glyphs automatic generation capacities. The transcription, employing various digital interfaces (virtual keyboards and gestural interfaces), use a modular glyptic structure that allows to stack several levels of description (phonologic [6] and phonetic [7,8]). This system can be actually displayed in two forms, a phonological decomposed sequence (generic form) or a logographical assembled symbol (composed form) in a totally transparent way for the annotator via a universally available opentype functionality (contextual ligatures). The entire list of possible glyphs is very large (tens of thousands), so the keyboard allows to choose the handshapes present in a specific SL, constraining the list to the repertoire of each SL. Once the typographic font is installed on a computer, it is available in any software including ELAN or ANVIL. We developed a graphic visual interface and also a real time gestural recognition (LEAP motion MoCap device [10]) tool to facilitate the selection of the glyphs. The user will be able to actually annotate the signs by gesturing. In this communication, we will present how the font and the devices (virtual keyboard and MoCap interface) work together.

Finally, the ratio between annotating time and duration of corpus is one of the well-known problems in annotating SL. We will discuss this ratio on French SL corpora, at different levels (generic vs. composed glyphs) and with the said devices. Results make the case for the use of our annotating system including the MoCap input.

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