

Text to SL translation

International workshop on Sign Language
Translation and Avatar Technology (SLTAT)
Challenge 1: Symbolic translation

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Zoomed-out line

- Challenges
- What we do

SLs and translation

- **Statistical methods for automatic translation**
 - Automatic learning of word or phrase mappings [A]
 - LARGE corpus of aligned parallel texts needed [B]
 - Alignment : probabilistic models of sequences [C]
- **Translation between WrL and SL**
 - SL: under-resourced languages → issue with B
 - SL: spatio-temporal grammar, temporal rules (sequences) not sufficient → issue with C
 - WrL: all syntactic structures align with lexical sequence; SL: not everything produced necessarily in sync with a given articulator (multi-linearity) → issue with A

We need more linguistics!

- **Lexicon**

- Usually phonetic descriptions with too little lexicography
- Frozen, depicting, pointing signs all in same list
- Often missing sign inflexion rules: context location, size...
- Heavily focused on manual components

- **Grammar**

- Semantic use of signing space is necessary
- Spatio-temporal linguistic structures
 - what and how things synchronise

- **Translation**

- Shallow translation and WrL-to-WrL models as they exist not looking good
- Our question is: how far from semantic processing can we reasonably stay??

From corpus analysis to evaluation

We need more corpus!

- Under-ressourcedness: little morpho-syntactic knowledge but too little data to perform corpus studies and acquire it
- Corpora must be built...
 - Material from multiple signers, various genres, different SIs, etc.
 - Mocap and video data?
- ...and annotated
 - Big question: what and how to annotate?
 - Re-usability: non-partisan annotation

From corpus analysis to evaluation

We need more evaluation!

- Output of the implemented systems:
 - Objective methods, e.g. recognition rates, reading back animations
 - Subjective methods, e.g. SL users spontaneous feedback
- But also what lies behind: what about the models?
 - Indicators: language coverage, ease of notation, implementation...
 - Question: how should we evaluate language/anatomic models?

LIMSI on lexicon modelling

```
1 SEQUENCE "accident"
2
3 <language=LSF>
4 <numvidlimsi="aucune">
5 <refdico="3-240-4">
6 <described_by="Nadège, Flora">
7
8 DEP loc = @ABST(w) + <FWD | medium>
9
10 KEY_POSTURE(0){
11   KEEP:
12     For $h=s,w
13       #all4_closed($h)
14       Place @T_l($h,3) at @R_BACK($h,2)
15     End
16
17   Place @PA(w) at [loc]
18   Orient NRM!palm(w) along UP+LAT
19
20   HERE:
21     Place @PA(s) at @PA(w) + <NRM!palm(w) | medium> - <DIR!palm(w) | small>
22 }
23
24 TRANSITION (10){
25   Accel 1
26 }
27
28 KEY_POSTURE(0){
29   HERE:
30     Place @I_BACK(s,2) at @T_INT(w,1)
31     Place @M_KN(s,1) at @PA(w)
32 }
33
34 END "accident"
```

- The *Zebedee* model [Filhol 2009]: sequence of time units specified with sets of geometric constraints
- Input used for GeneALS [Delorme 2009], corpus built ~ 2,000 signs
- Additional software for:
 - Searching through data base
 - Parsing, processing geometric objects

Zebedee

Overview, with description example of index pointing sign

- **NSCs** (finger may bend)
- **Context deps**, e.g. dir-verbs, iconic geometric features...

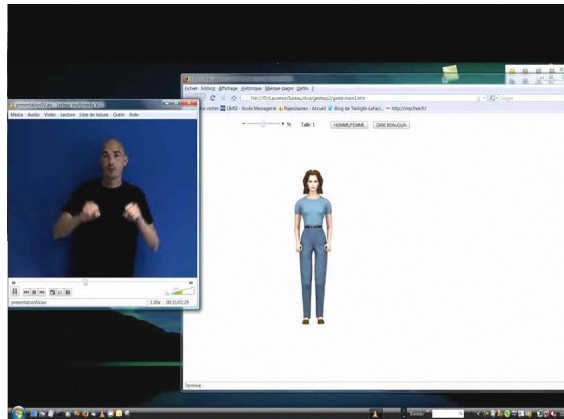
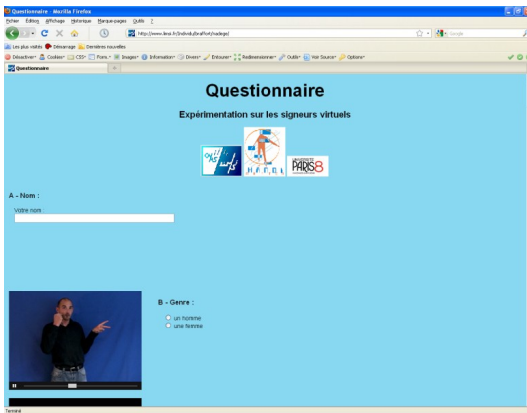
In essence:

- Sign variability is part of every sign's descr, accounted for on the first level
- Context dependencies enable to specify semantic interfaces
- Internal dependencies relevant to cognitive features, surface production only just “happens”

```
1 SEQUENCE "index pointing in signing space"
2   <language=LSF>
3   <numvidlimsi="aucune">
4   <refdico="aucune">
5   <described_by="Flodège">
6   <sens="pointage, ça, désigner">
7
8   DEP target : Point
9
10  Alias %dir -> <@SH(s), [target]>
11
12  KEY_POSTURE (0) {
13    HERE:
14    Place @I_TIP(s) at @SH(s) + <%dir | medium>
15
16    KEEP:
17    #L_closed(s)
18    #R_closed(s)
19    #M_closed(s)
20    Place @T_l(s,3) at @M_BACK(s,2)
21    Orient DIR!index(s, 3) along %dir
22  }
23
24  $start <- @I_TIP(s)
25
26  TRANSITION (1) {
27    Accel 1
28  }
29
30  KEY_POSTURE (2) {
31    HERE:
32    #I_straight(s)
33    Place @I_TIP(s) at $start + <%dir | small>
34  }
35
36  End "index pointing in signing space"
37
```


LIMSI on evaluation

- Spontaneous feedback on virtual signing understanding: experimental protocol design by ergonomist [Devos 2009]



- Evaluation of *Zebedee*: 2,000 descr in DB [Filhol 2010] = (DictaSign concept list) U (IVT LSF dictionary)
- TODO for further evaluation on models :
 - transfer to (willing) linguists for expert feedback on linguistic validity of the approach to description
 - Put together the descr-to-anim pipeline to evaluate the output animations

LIMSI on corpora

- **Corpus building**

- with DictaSign
- [Segouat 2010]
- Websourd-SNCF

- **Corpus annotation**

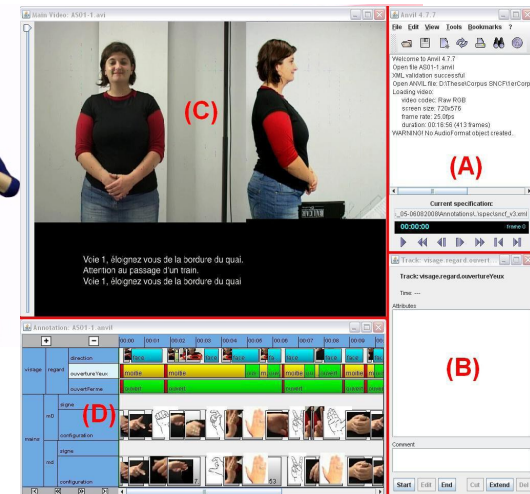
- Problem:

- what grids?? ← now *that* is some question
- how objective can we get and still be useful/re-usable?

- Per se:

- FLS glossing on DictaSign corpus (Trevor, please react [here](#))
- Numerical (xy-coordinates of points on eyebrows) [Chételat 2010] vs. empirical (categories built on the fly) [Segouat 2010]
- Signing space: tentative ways of annotating (re-)use of signing space locations or zones

- **TODO:** Signing space annotator, with (or inspired by) previous IRIT software *VIES*



Conclusion

Challenges

- Corpus building to better resource the target language and enable abstraction
 - more data to allow moving away from it!
- More linguistic input to inform models
 - crucial to include linguistics in language-related computer applications, and that linguists make the effort to... talk to “us”
- Still the question of evaluation...

Questions?

To be

or not to be.