

An Articulatory Model for Annotating Non-manual Markers in Sign Languages

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ANNOTATION SCHEMA: Design principles

Model = Articulator x Movement direction/type (AM)

Articulators: ~14

- ❖ Selected for *perceptual saliency*
- ❖ Aim of medium-grained phonetics

Movement: 6 deg. for (rigid) 3D obj.

- ❖ 3 axes x 2 types (rotational & linear)
- ❖ Some articulators less (e.g., nose)
- ❖ Marked relative to signer's 'neutral'

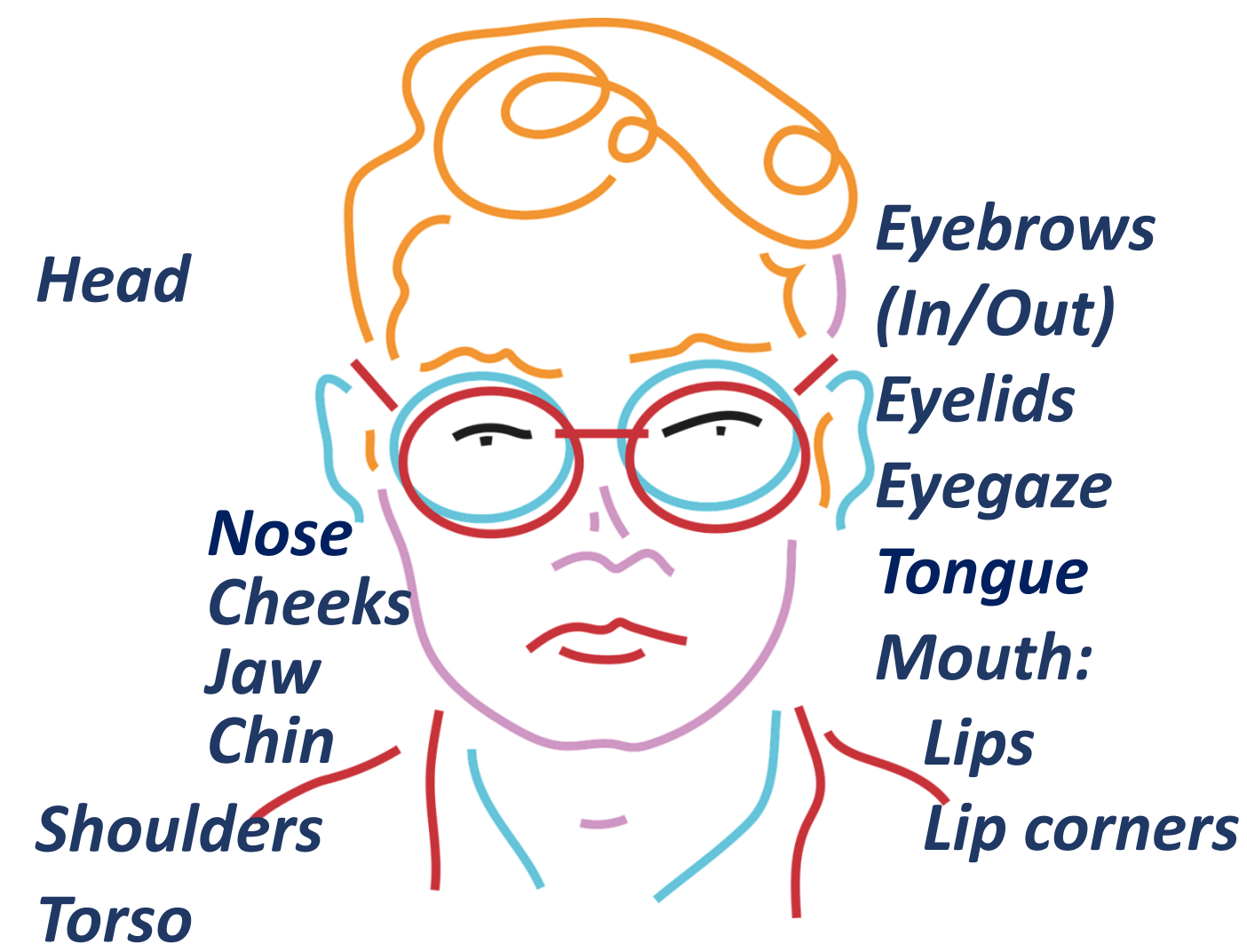


Figure 1: Articulators in AM model
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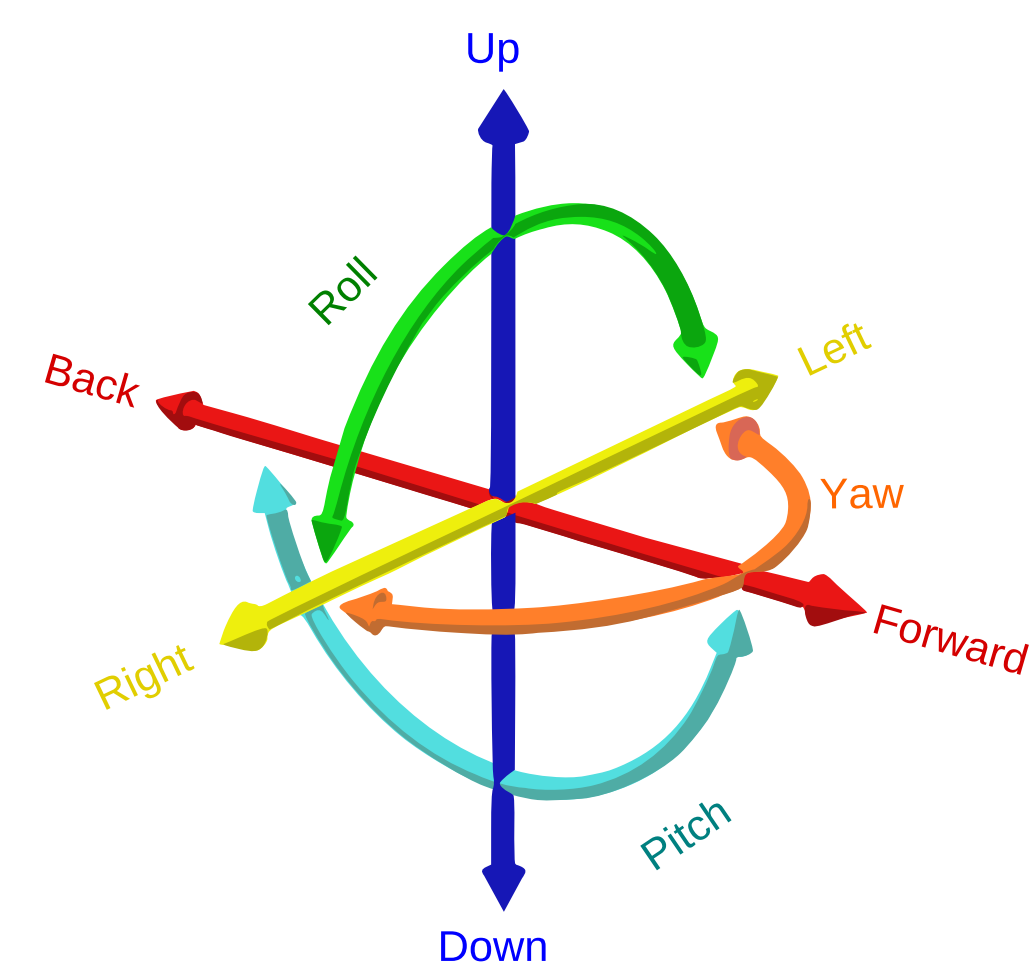


Figure 2: 6 degrees of freedom
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Make user (annotator) friendly

Decision-tree style annotation procedure, when articulator in ? moves:

1. Single, multiple, or trilled movement?
2. Is the movement linear along the Y-axis? If Y,
 1. Which direction (dominant or non-dominant)?
 2. To what extent does it move? (Min, Mid, Max) (Repeat for axis/movement types)
 3. If biarticulator, is movement symmetrical?
3. If N, move on to next axis/movement-type

ANNOTATION SCHEMA: Rationale & benefits

Increase efficiency of data processing wrt analysis

- ❖ Work to reduce annotator training while maintaining accuracy
- ❖ Easier to search for correlations in previously processed data with new research

Build-in known linguistic processes

- ❖ Anticipates processes like reduplication
- ❖ Ability to annotate macro-physical movement comprised of sub-movements
- ❖ Wider range of annotation for head, shoulders, torso, and tongue in particular

Consistency

- ❖ Across methods of data collection, including motion capture data
- ❖ Across descriptions in the literature
- ❖ Across articulators (offers more precision)

REFERENCES

- [1] Ekman, R. 1997. *What the face reveals: Basic & applied studies of spontaneous expression using the Facial Action Coding System*. Ox. Univ.
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- [3] Bickford, J. & K. Fraychineaud. 2006. "Mouth morphemes in ASL: A Closer look." In *papers from the Ninth TISLR Conference*.
- [4] Gökgöz, K., & E. Arik. 2011. "Distributional & syntactic characteristics of non-manual markers in TİD." In *Proceedings of WAFL7*, edited by A. Simpson, 63-78. Boston: MITWPL.
- [5] Göksel, A. & M. Keleşir. 2013. "The phonological & semantic bifurcation of the functions of an articulator: HEAD in questions in Turkish Sign Language." *Sign Language & Linguistics* 16(1): 1-30.

AM SCHEMA IN ACTION: Head, Eyebrows, and Eyelids

Figure 3: Example of proposed annotation schema applied to the articulators Head, Eyelids, and Inner/Outer Eyebrows in ELAN (some articulators excluded for brevity)

Rationale & benefits (cont'd)

Limit prior knowledge

Ex: Remove coding such as 'whq'

- ❖ Reduce chances of researcher bias
- ❖ Flexible across SLs and collection methods

Rooted in articulation; interfaces with perception

- ❖ Focus on space emphasizes interface of articulation and perception
- ❖ Possible some movement aids perception, but is not strictly required

REQUESTING YOUR FEEDBACK

Capturing attested forms

- ❖ What known linguistic distinctions & NMMS should we make sure are captured?

Identifying theoretical assumptions

- ❖ What assumptions do we seem to be making?
- ❖ How might that impact use and/or unintentionally introduce observer bias?

Anticipating corpora and analysis needs

- ❖ What corpora and analysis needs have we possibly overlooked?

Accounting for human error

- ❖ Recommendations for data validation procedures and safeguards

WITHOUT IGNORING PRIOR LIT, BUT...

Not adapted from other fields

- ❖ Counter, ex: FACS^[1]

Focused on more than subset of articulators

- ❖ Counter, ex: various within The hands are the head^[2]

Not ad-hoc

- ❖ Counter, ex: seen throughout the literature^[3, 4, 5]

FUTURE DIRECTIONS

Further test annotator (training) procedures

- ❖ Publish beta-phase technical documentation and ELAN template
- ❖ Inter-rater reliability testing

Investigate perception of NMMS (understudied)

- ❖ What movements are primary v. secondary cues for given NMMS?
- ❖ What differences exist in perceptions (e.g., signers v. non-signers; TID v. ASL)?

Build corpora

- ❖ Raw data is not the problem; meaningfully tagged, well-structured data is the issue

Engage with citizen science

- ❖ If training can be simplified enough, may allow engagement of citizen scientists