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## Sub-parametric features of head movements and gaze conveying epistemicity: a study on French Sign Language (LSF) and French co-speech gestures.

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## Introduction

### Aim of the LexiKHuM project

- Explore human gestural communication (Sign Language [SL] and co-speech gestures [G]) to extract articulatory traits conveying Kinesthetic Meaning Units, then implement these units in a haptic HCI device (helicopter piloting device)
- Our experimental unit: **epistemicity** (certainty/uncertainty)

### State of the art on epistemic gestures

- Epistemicity is often associated with specific head gestures

	Certainty	Uncertainty
SL	Rapid head nods	Slow head tilts and nods
G	Clear and strong head nods	Head tilt

- Usually, SL and G are analyzed in a holistic way: there is no detailed **articulatory description** of head gestures

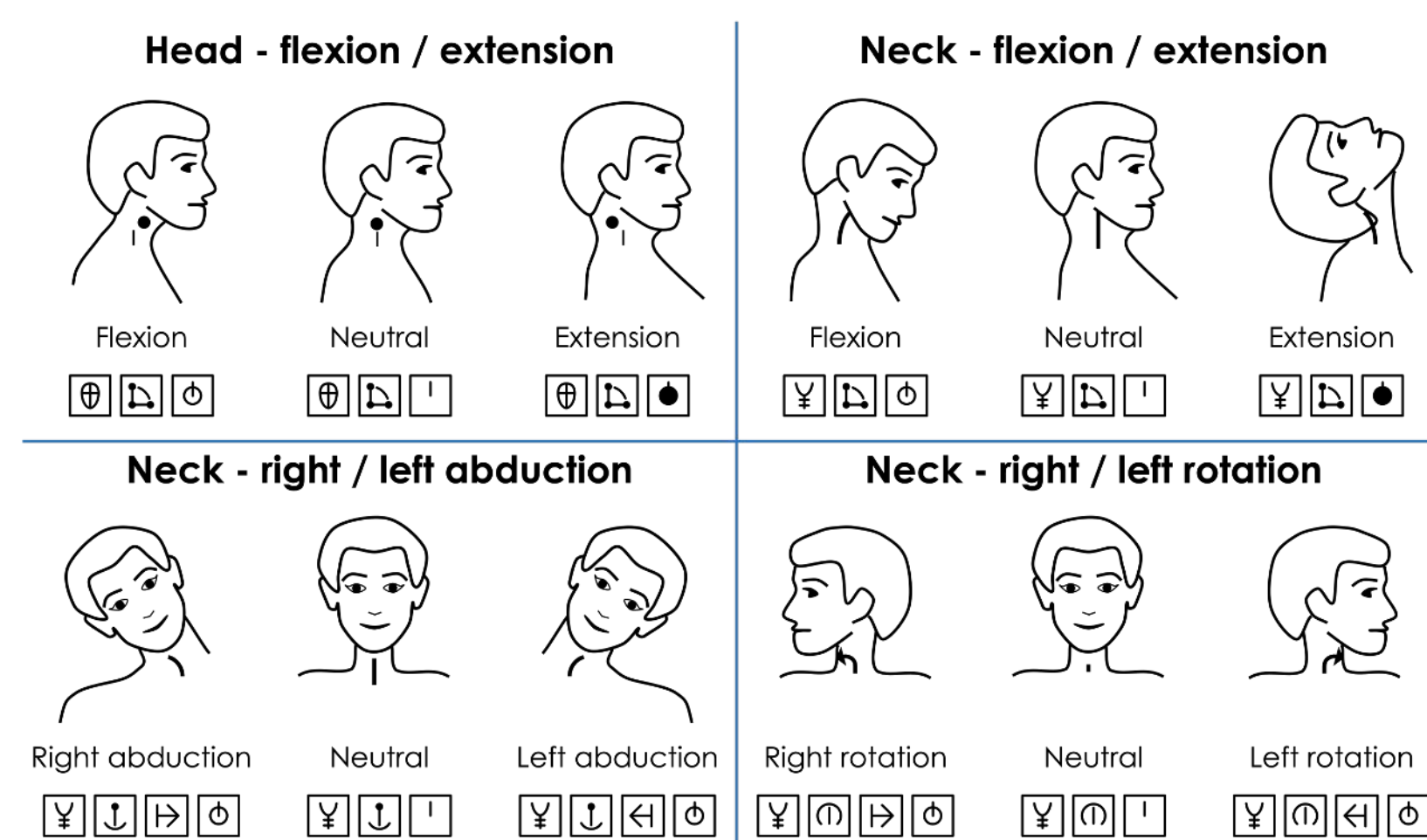
### Our hypotheses

- Some properties of head movement are involved in the construction of epistemic gestures in SL and G
- The association of gaze direction and head movement is also relevant to express epistemicity
- We tested our hypotheses on **head flexion-extension and gaze**

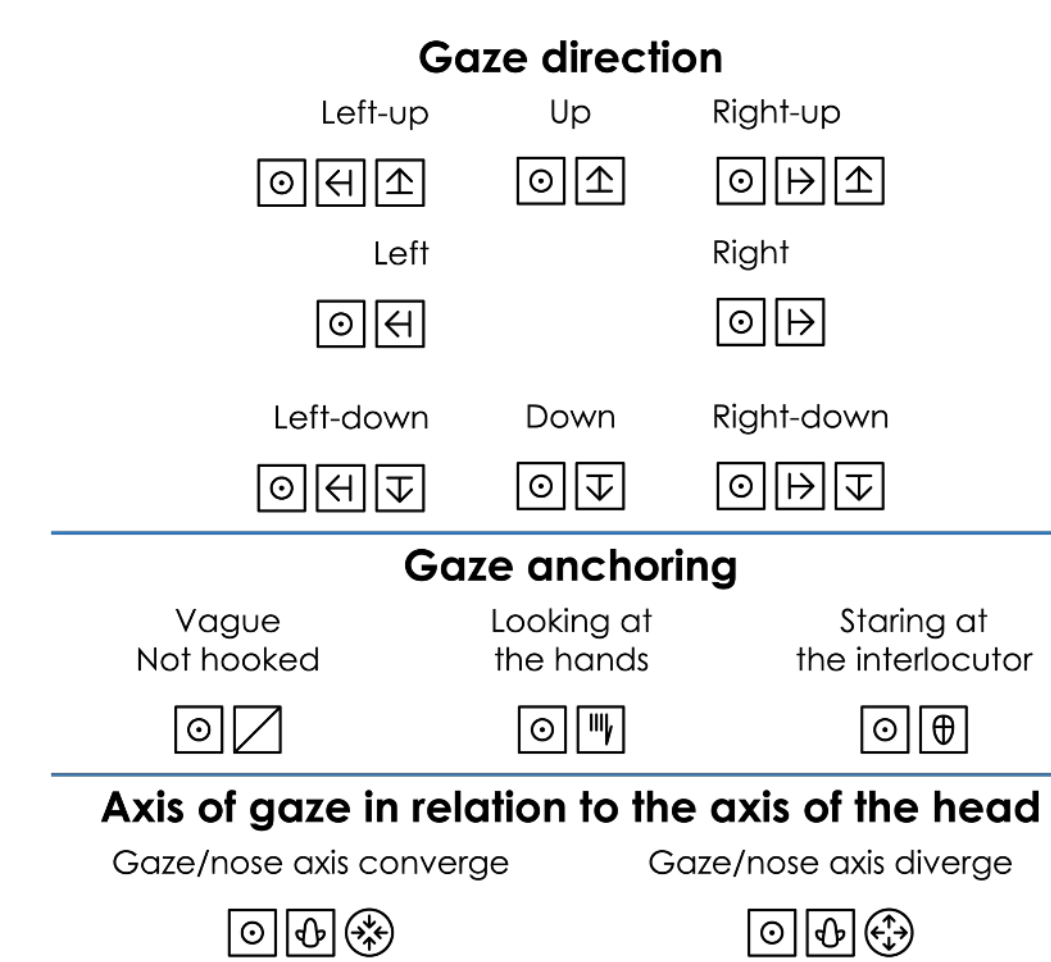
## Corpus DEGELS1



## Head position annotation



## Gaze annotation



## Methodology

### Analysis grid

- Based on kinesiological studies and analyses of movement in SL prosody
- Transcribed with the Typannot kinesiological transcription system

### Annotation methodology

#### Points of interest [POI] identification:

- Semantic analysis of the corpus to identify POI with strong epistemic indications
- **40 sequences selected**

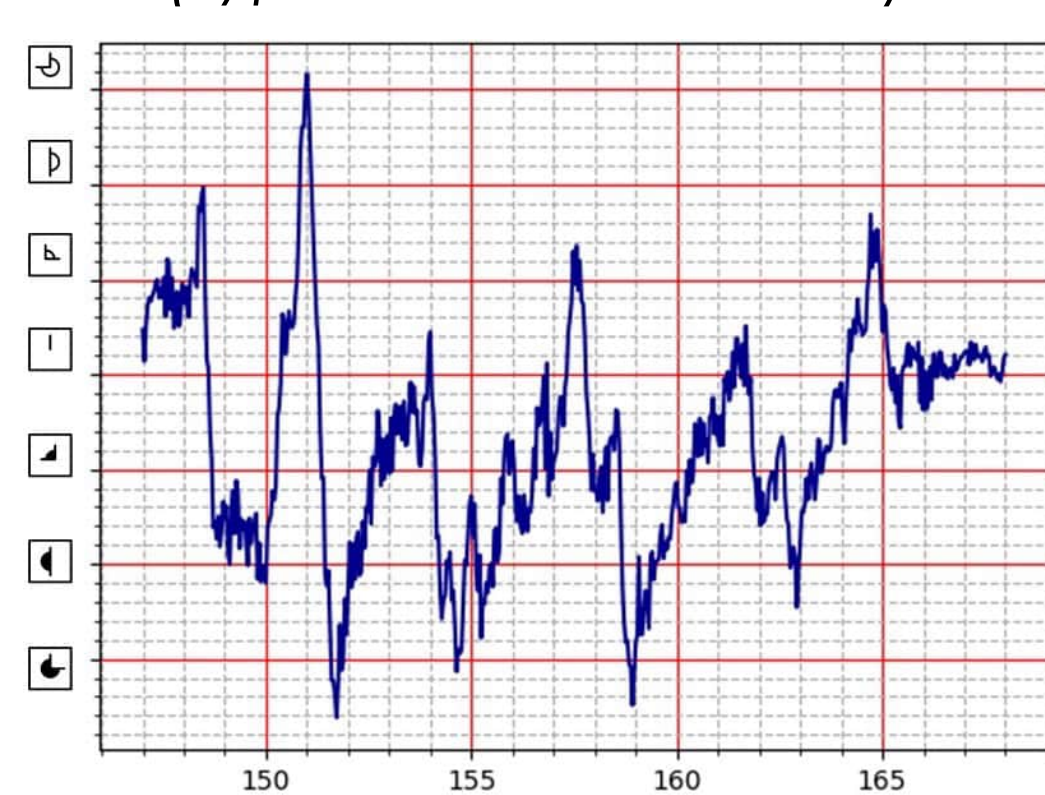
#### transcription of POI articulatory features :

- Two complementary methods:
- manual annotation using ELAN
- **semi-automatic annotation** using AlphaPose Motion Capture [MoCap]

## Certainty

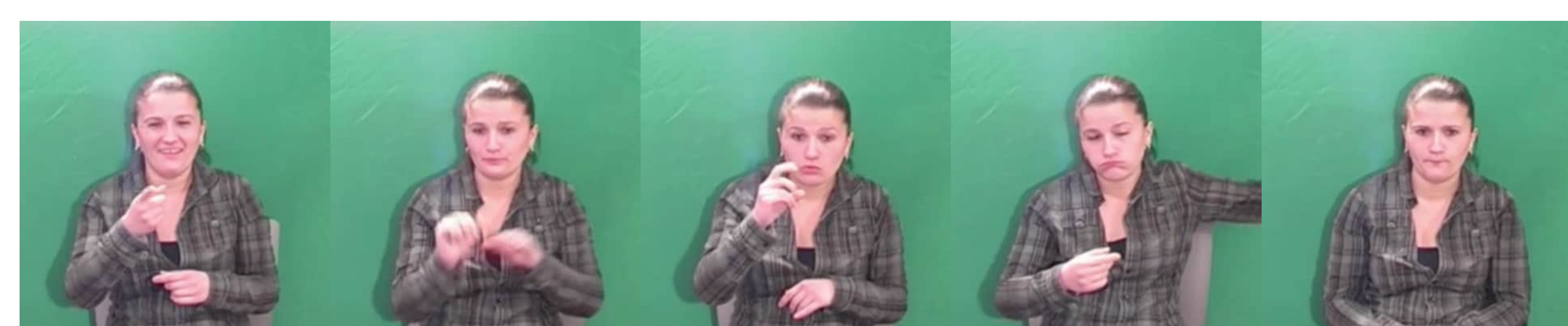
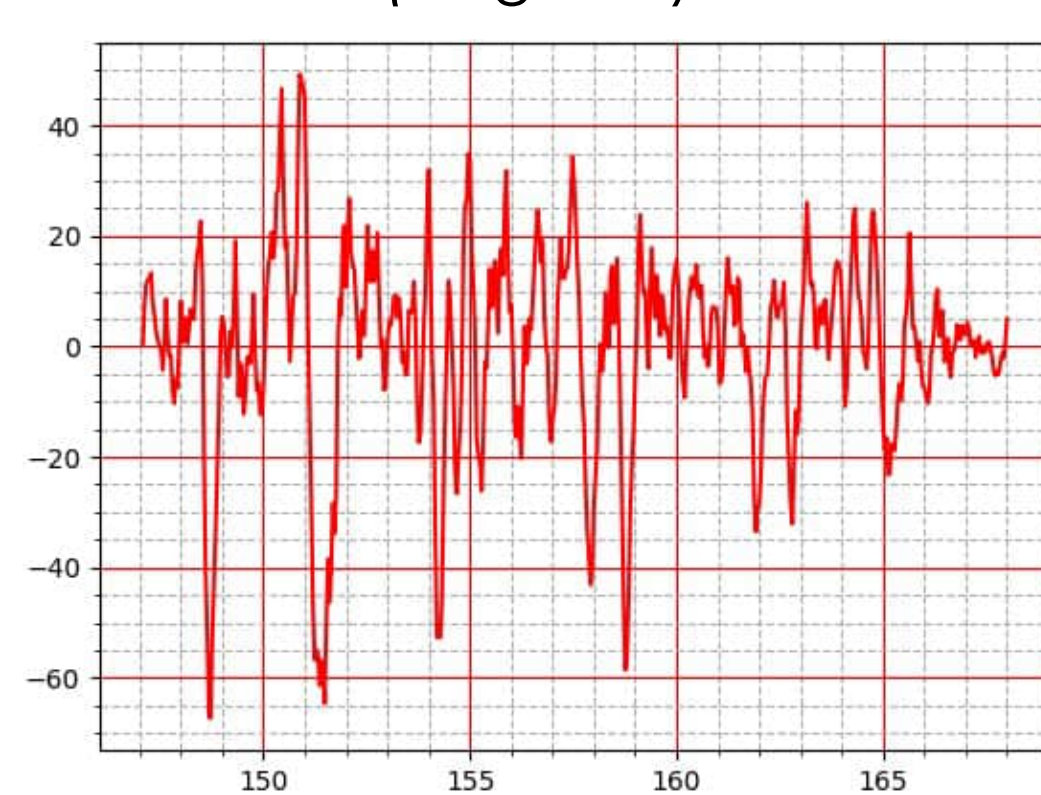
### Neck - FlxExt amplitude

(Typannot notches/sec)



### Neck - FlxExt speed

(deg/sec)

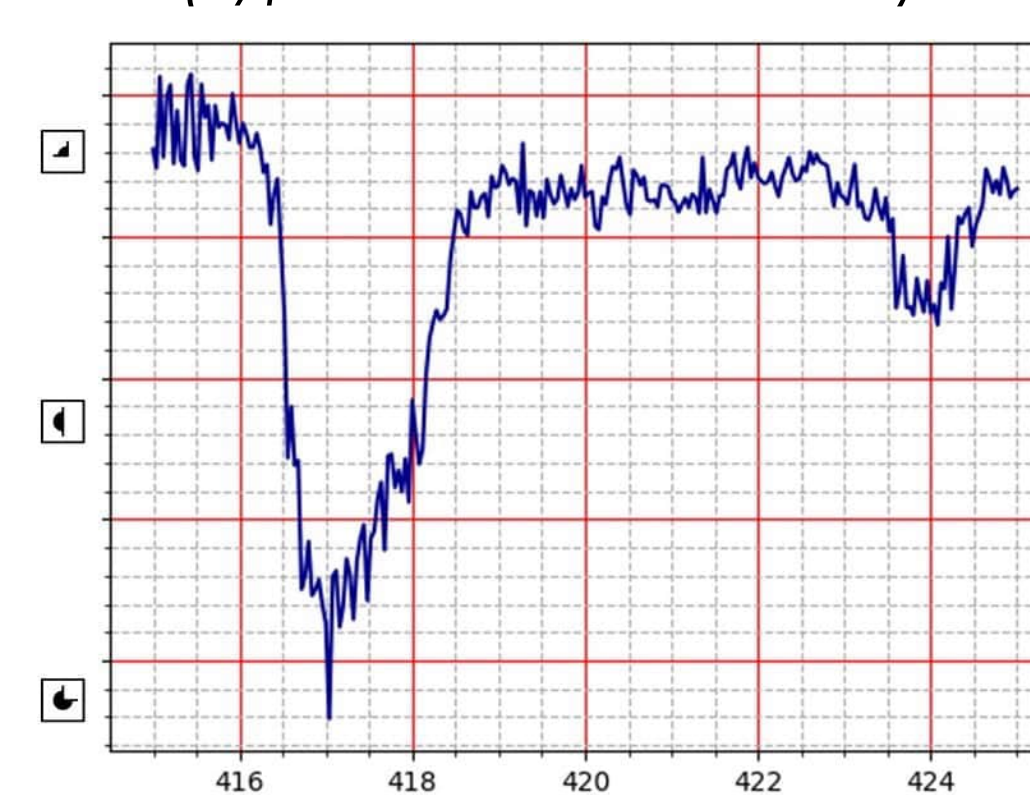


Gaze: [gaze icons] (x4) - [gaze icon]

## Uncertainty

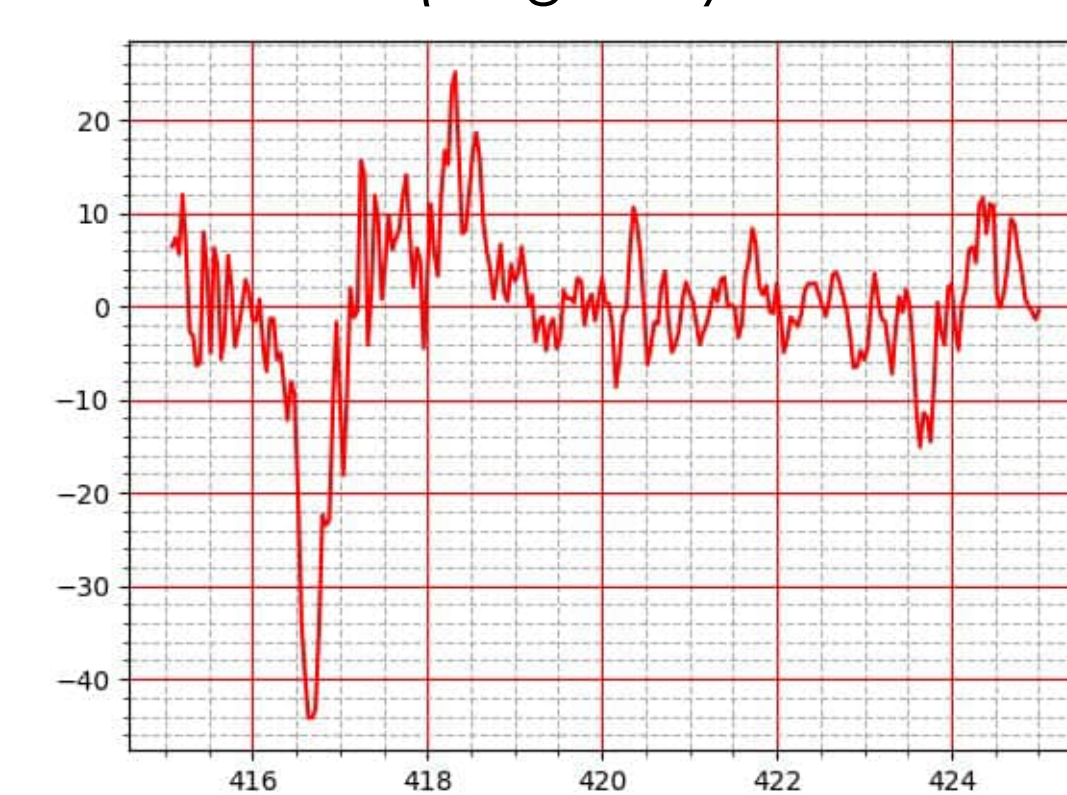
### Neck - FlxExt amplitude

(Typannot notches/sec)



### Neck - FlxExt speed

(deg/sec)



Gaze: [gaze icons]

## Results

	Certainty markers	Uncertainty markers
<b>Movement</b>	repeated nods (passing through neutral position)	holding neck (out of neutral position)
<b>Tension</b>	motion tension (large speed contrasts)	relaxed movement (no significant speed contrasts)
<b>Gaze</b>	interlocutor & hands	vague
<b>Gaze/head</b>	aligned	unaligned

## Conclusions

- Sub-parametric characteristics of SL and G can be investigated thanks to our articulatory description
- There are common features between SL and G for epistemics gestures
- Further steps: apply our methodology to shoulder and torso; expand our corpus; enrich MoCap data and analysis

## Credits

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ESAD GestualScript Team (Typannot)  
K. Bou Orm & R. Fath (MoCap analysis)  
M. Nauge (MoCap protocol validation)  
A. Morgenstern (protocol validation)

## Bibliography

