



HAL
open science

From gestures to kinesthetic modality: how to express epistemicity in a haptic device for human-machine interaction

Fanny Catteau, Claudia S. Bianchini, Aliyah Morgenstern

► **To cite this version:**

Fanny Catteau, Claudia S. Bianchini, Aliyah Morgenstern. From gestures to kinesthetic modality: how to express epistemicity in a haptic device for human-machine interaction. 9th Conference of the Intl Soc. Gesture Studies: Gesture, from description to application (ISGS9), Jul 2022, Chicago IL, United States. <hal-03741158>

HAL Id: hal-03741158

<https://hal.science/hal-03741158v1>

Submitted on 31 Jul 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



HAL Authorization

From gestures to kinesthetic modality: how to express epistemicity in a haptic device for human-machine interaction

Introduction

Aim of the LexiKHUM project

- Explore human gestural communication (Sign Language and co-speech gestures) 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 hypothesis

- Sub-parametric features of the gesture mark epistemicity, and not the gesture as a whole
- We test our hypothesis on **head movements**

Corpus

3 hearing dyades (French co-speech gestures - 39'56")

3 deaf dyades (French Sign Language - 36'00")



6 conversations about...



Best things to do in Marseille

Methodology

Grid of analysis

- Based on kinesiological studies and analyses of movement in SL prosody
- Transcribed with Typannot, a transcription system developed for kinesiological studies
- If you are interested in Typannot, come to C. Danet conference (Jul 14, 3:15 PM, Corboy 209)

Annotation methodology

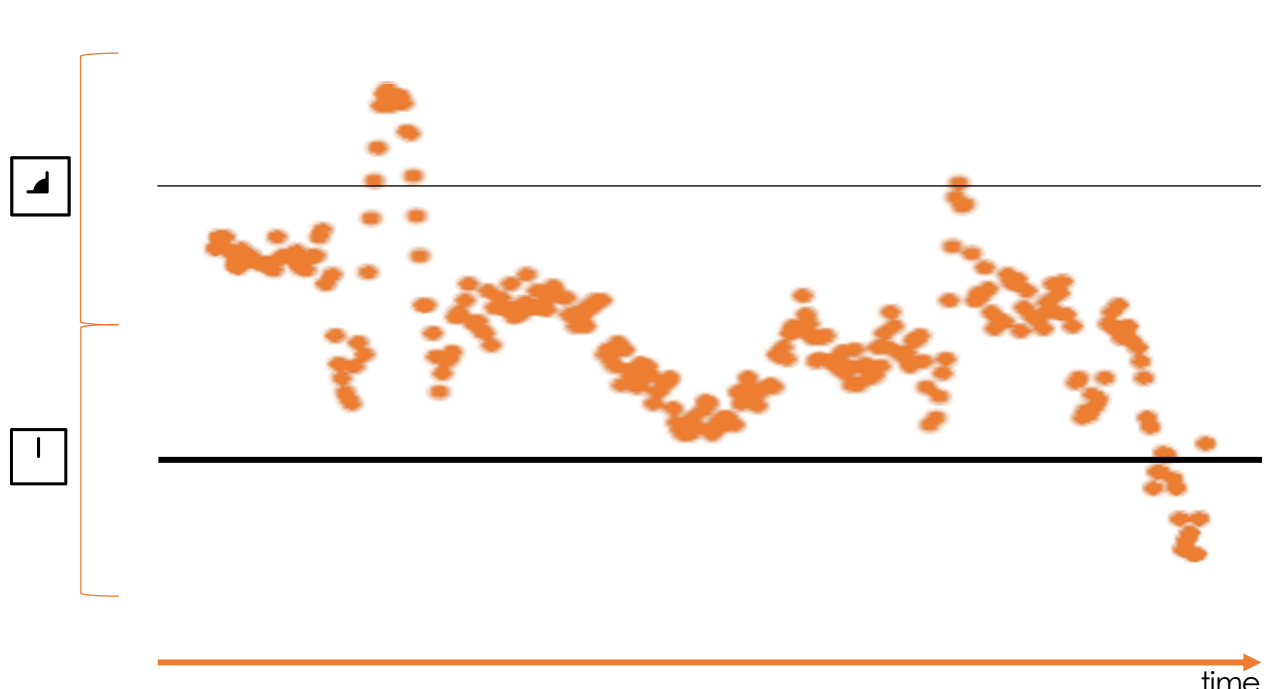
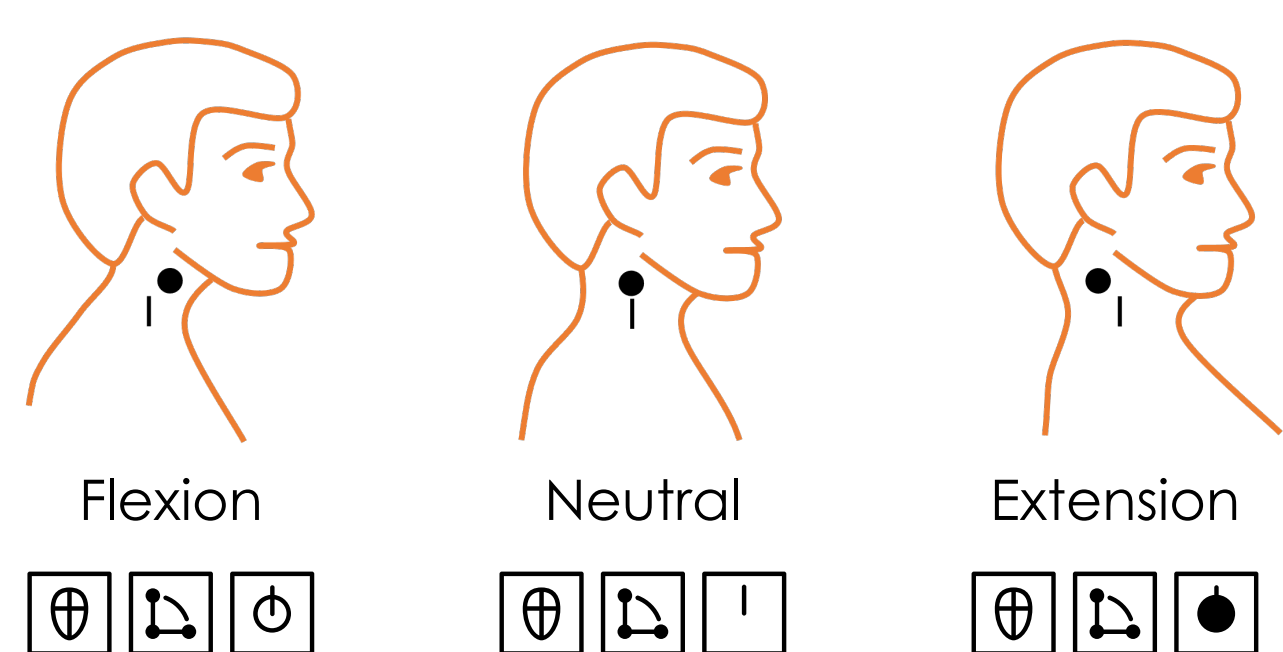
- Points of interest (POI) identification:
- Semantic analysis of the corpus to identify POIs with strong epistemic indications
- Inter-annotator agreement to validate the POIs selected for this study

POIs transcription:

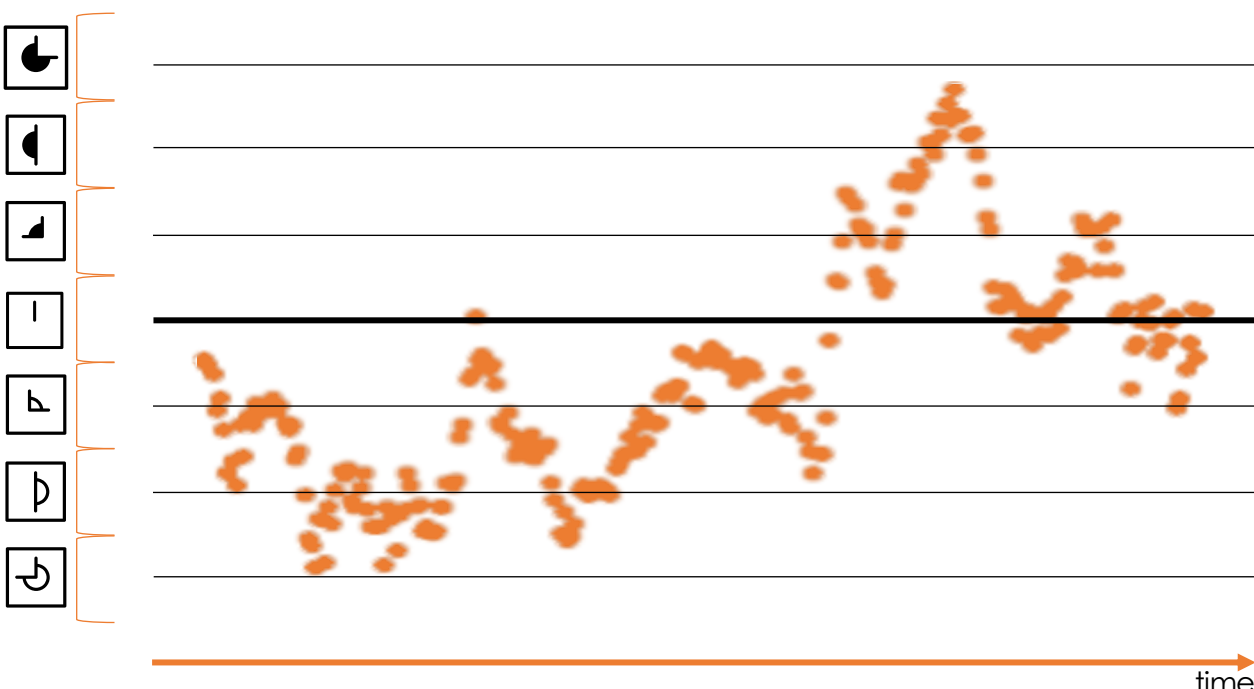
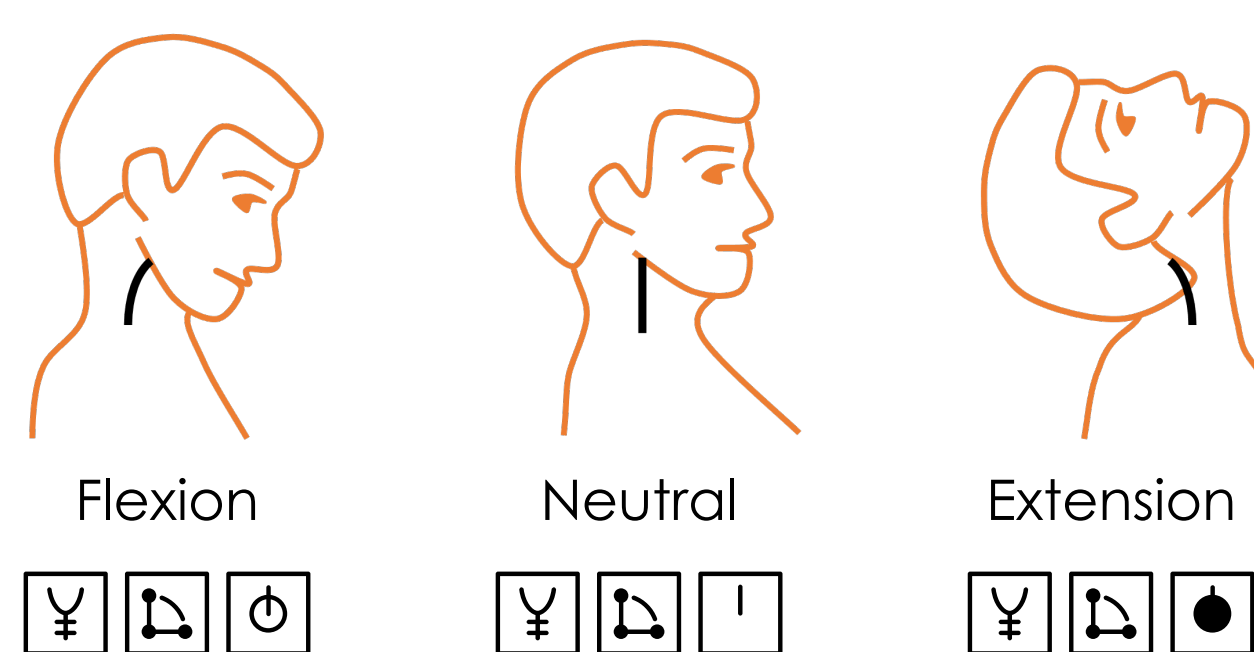
- Two complementary methods to annotate articulatory features
- manual annotation using ELAN
- semi-automatic annotation using Motion Capture (AlphaPose, Opencyv)

Head

Flexion / Extension

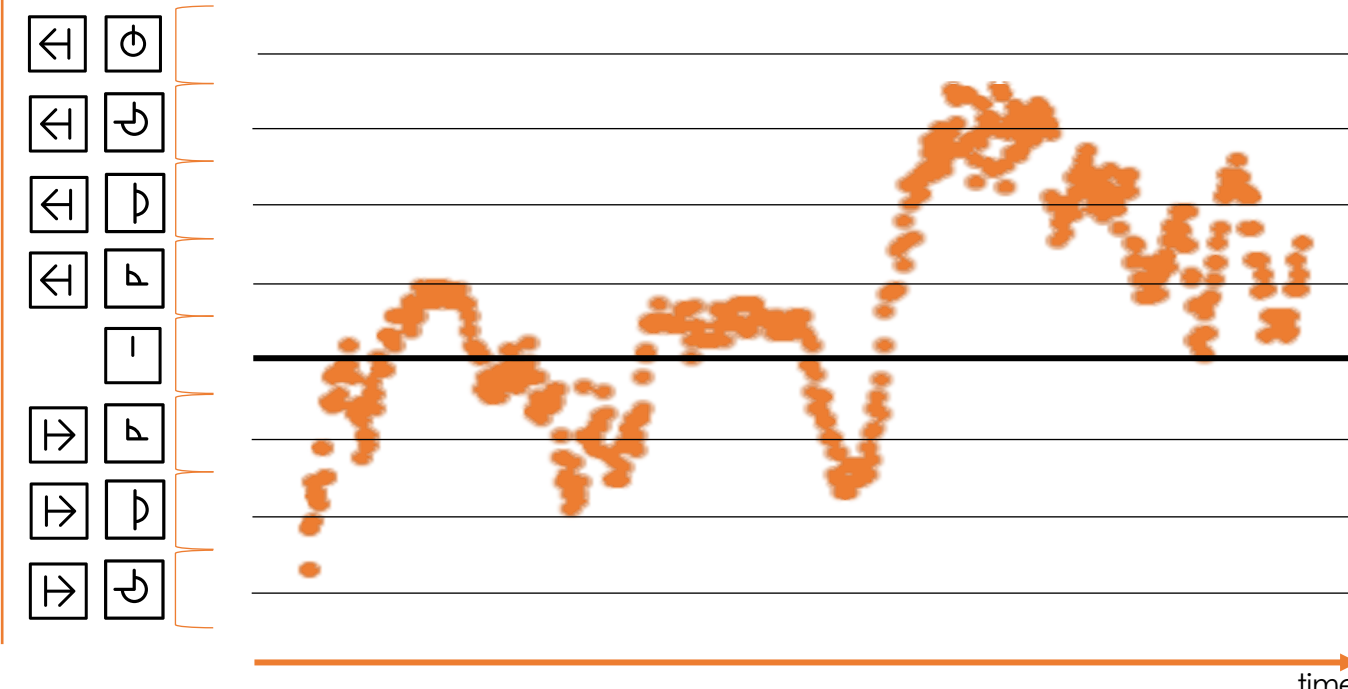
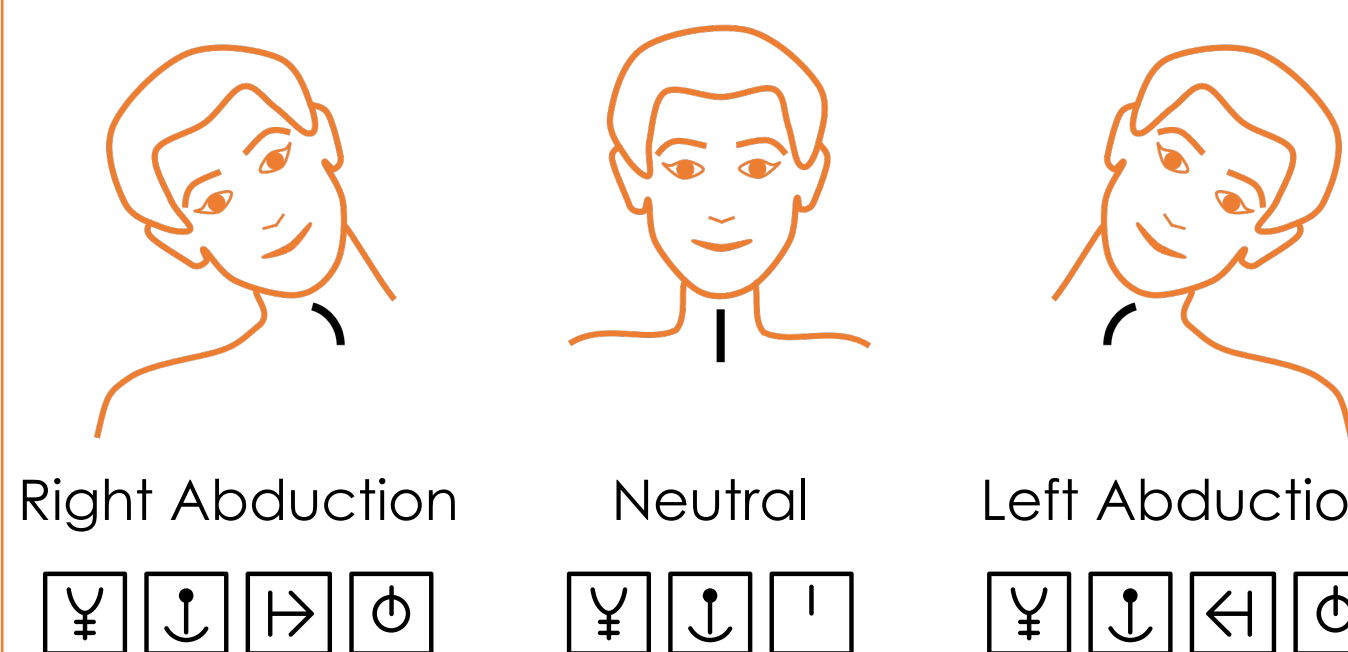


Flexion / Extension

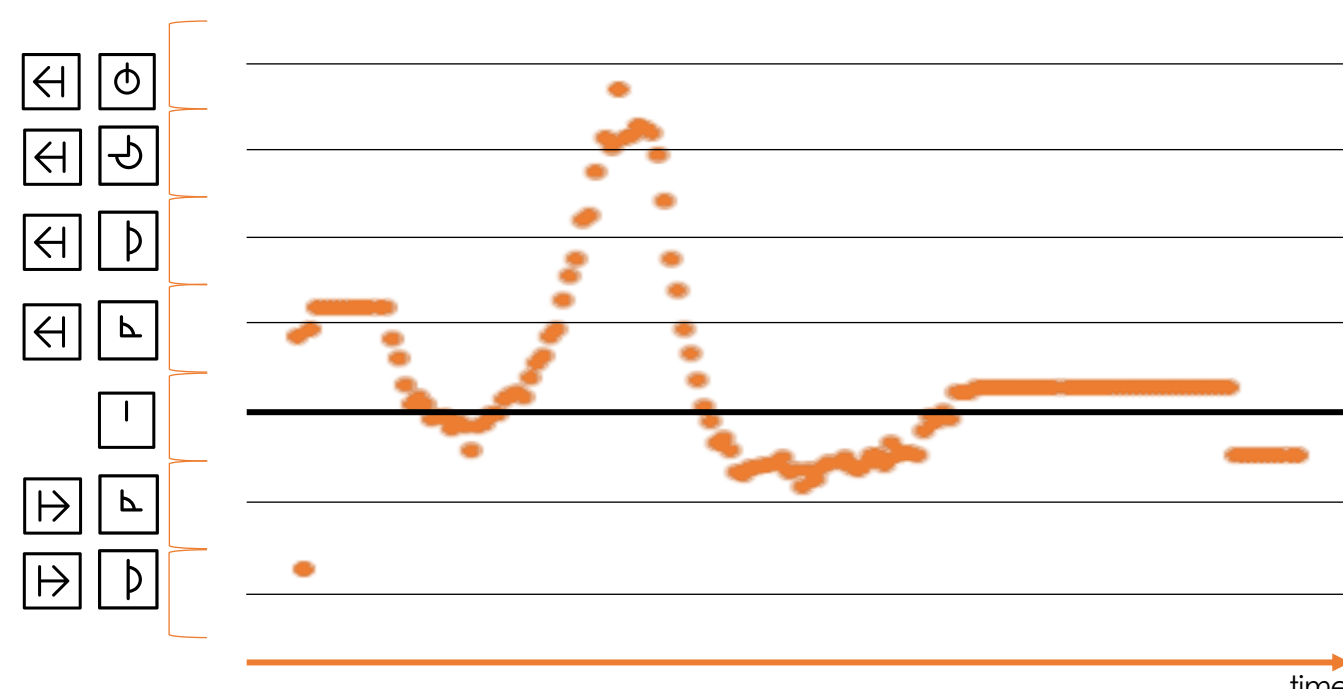
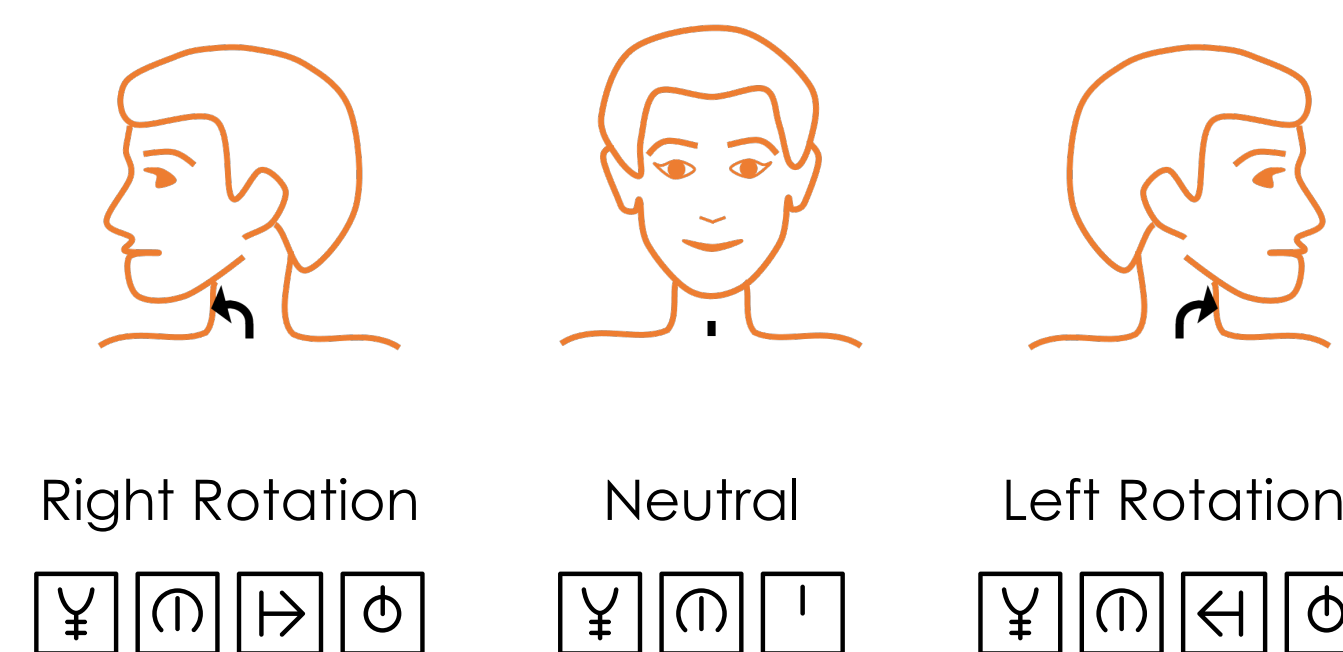


Neck

Right / Left Abduction



Right / Left Rotation



Some preliminary findings

Certainty

Head Flex-Ext

[SL&G] greater amplitude of head movements always going through the neutral position

Uncertainty

Head Flex-Ext

[SL] head hold

Neck Rotation

[SL] greater amplitude of neck rotation movements

Conclusions

- Sub-parametric characteristics of gestures and signs can be investigated thanks to our articulatory description
- There are common features between SL and G for epistemic gestures
- Further steps: apply our methodology to head, shoulder, torso and gaze, in a larger corpus; enrich MoCap data and analysis

Credits

Our team would like to thank:
 L. Boutora & A. Braffort (Degels1)
 ESAD GestualScript Team (Typannot)
 K. Bou Orm (MoCap data analysis)

The LexiKHUM project receives funding from the French National Research Agency (ANR), grant n° ANR-20-CE33-0012

Bibliography

