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# The SignAge Corpus: Recording older signers with low cost motion capture devices

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## 1. Introduction

### Low cost motion capture (mocap) devices

For almost ten years, the marketing of low cost motion capture devices such as the Microsoft Kinect sensor has enabled numerous studies in real-life settings (Mosina, Hendri & Khezmem, 2014; Webster & Gott, 2014; Springer & Yoger Seligmann, 2016). Whereas most of this work with older people is studying gait and fall risks (see Mosina, Zumi, Rezaei, Mignotte, & Neumann, 2011 for example), we propose to focus on the building of the SignAge corpus dedicated to the study of signing in older deaf participants with low-cost motion capture devices.

### Impact on sign language studies

Up to now, a (preferably multi-)camera setup was considered a basic requirement in sign language studies, sometimes completed with more intrusive or expensive equipment such as data gloves, optical motion capture systems (Channon, 2015, p. 132–133). But latest technology advancements allow us to quantify 3D motions and their time derivatives at a reasonable price. Our new SignAge corpus of interactions between older deaf signers in LSF takes advantage of such advancements.

## 2. Building the SignAge corpus

2 digital camcorders, 2 Noitom Perception Neuron body straps, 1 Kinect

<table>
<thead>
<tr>
<th>Data flows</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video</td>
<td>2 digital camcorders (as in Bolly &amp; Boutet, 2016)</td>
</tr>
<tr>
<td>Mocap 1</td>
<td>2 Noitom Perception Neuron body straps with 25 IMU</td>
</tr>
<tr>
<td>Mocap 2</td>
<td>Kinect v2 depth sensor</td>
</tr>
</tbody>
</table>

A collection combining video (2D) and biomechanical (3D) data

### Setup

- **Cameras, Kinect and Neuron**
- **Equipment and participants layout during the data gathering**
- **Real-world setup viewing**

## 3. Data workflow

<table>
<thead>
<tr>
<th>Flow</th>
<th>(1) Acquire</th>
<th>(2) Reformate and clean</th>
<th>(3) View</th>
<th>(4) Sync</th>
<th>(5) Annotate and analyse</th>
<th>(6) Assess quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video</td>
<td>ER+EE</td>
<td>.mts (HQ) , .mp4 (LQ)</td>
<td>ELAN</td>
<td>ELAN</td>
<td>Based on start and end claps for both ER and EE</td>
<td>Drift 60.6 Hz</td>
</tr>
<tr>
<td>Video</td>
<td>EE</td>
<td>.mts (HQ) , .mp4 (LQ)</td>
<td>ELAN</td>
<td>ELAN</td>
<td>MatLab MoCap Toolbox</td>
<td>Drift 60.6 Hz</td>
</tr>
<tr>
<td>Mocap</td>
<td>ER</td>
<td>Axis Neuron, Python b2d</td>
<td>Motion Inspector</td>
<td>MatLab MoCap Toolbox</td>
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<td>Kinect</td>
<td>EE</td>
<td>Brekel Pro Body v2</td>
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<td></td>
</tr>
</tbody>
</table>

Summary of the steps necessary to analyse the 5 data streams

- Hypotheses: Correlation age ↔ Articulatory segment involved (ER: Interviewee, EE: Interviewee)

## 4. Conclusions

- Low cost, portability, ease to get accustomed to wearing the body straps
- Limits in space resolution (Neuron) and time resolution (Kinect) → need more data to confirm Kinect and Neuron might still be an interesting choice to get usable additional 3D data in aging studies

### In progress

- Short term: Compare accuracy of Neuron mocap data with simultaneously recorded OptiTrack Prime 13 mocap data
- Longer term: Develop annotation support tools; use OpenPose detection library

## 5. References

**Bibliography**


**Workshop (equipment, software and corpus)**

- OptiTrack Prime 13: [http://www.optitrack.com](http://www.optitrack.com)
- ELAN: [http://www.mpi.sfb118.de/software/elan](http://www.mpi.sfb118.de/software/elan)
- OpenPose: [https://github.com/CMU-PerceptualComputingLab/openpose](https://github.com/CMU-PerceptualComputingLab/openpose)
- NeuronMotion: [http://www.neuron-motion.com](http://www.neuron-motion.com)
- NeuronMocap: [http://www.neuronmocap.com](http://www.neuronmocap.com)

## 6. Acknowledgements

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