The Sound of Silence:  
A Journey Through Deaf Culture in Hong Kong

Team leader: Prof. Youngah Do

Team members: Dr. Arthur Thompson, Dr. Robert Marcelo Sevilla, Wing Cheung Aaron Chik, Lihui Frank Tan, Shuang Zheng, Chuwen Joanna Chen, Fei Peng Kevin Chen, Pui Ching Rachel Chen, Yu Hei Hannah Chung, Xin Olivia Liang, Chui Yin Judy Ng, Yu On Mavies Ngai, & Wing Tsun Jeff Yip

Department of Linguistics, Faculty of Arts
15 May 2024
Engagement

• The Department of Linguistics at HKU has collaborated with the following parties for this project:
Summary of the Impact

• **Technological impact**: A Hong Kong Sign Language (HKSL) detection model has been developed, with potential applicability to other sign language detection systems.

• **Educational impact**: Collaborating with HKSL educators from the Deaf community, an inclusive education model and curriculum have been implemented, enabling hearing students to effectively learn sign language.

• **Social impact**: Video recordings of HKSL signs were made with Deaf consultants and hearing learners to preserve the endangered language. This documentation combines naturalistic and structured data, a first in the field of HKSL.

• **Cultural impact**: A documentary film and art project involving both deaf and hearing individuals have been produced, shedding light on the experiences of the Deaf community in Hong Kong and emphasizing the vital role of HKSL in shaping Deaf identity.

• **Welfare impact**: HKSL learners who participated in this project played a vital role in rescue teams, offering essential emergency assistance to individuals who are deaf or hard of hearing.
Underpinning Research

Hong Kong Sign Language (HKSL)

• HKSL is endangered and is not an official language in Hong Kong.

• Approximately 6,000 people in Hong Kong use HKSL as their primary means of communication.

• The Deaf community, who are the main users of HKSL, face marginalization due to language barriers.

• The Deaf culture does not have a written tradition and is passed down orally.

• The language barrier, along with ableism and social stigma, hinders Deaf individuals’ access to education.

• Currently, HKSL lacks institutional and educational support.

• The number of Deaf schools in Hong Kong has been reduced from five to only one, serving a limited number of 60 to 100 students.
Our aims

• **Documenting** HKSL and its visual characteristics
• **Preserving** HKSL and the intangible Deaf culture
• Facilitating **teaching and learning** of HKSL
• Promoting a sense of **ownership** and legitimacy
• **Connecting** the hearing and Deaf community through outreach efforts

Resources that allow easier access and connection with the Deaf community overcome the language barrier.

This allows the Deaf culture to overcome the difficulties of being in an isolated, illiterate minority.
Underpinning Research

• GRF 2020/2021 (17603120 on articulatory and manual gesture learning)
• GRF 2022/2023 (17607522 on HKSL learning)
• GRF 2023/2024 (17602723 on machine learning vs. human learning)
Underpinning Research

Language documentation

• A prerequisite to investigate visual characteristics is documentation.
• Through collaboration with Deaf HKSL educators and the Deaf community (2021-ongoing), we documented a wide-range of HKSL data.
• The data acts as a reference resource and preservation effort.

<table>
<thead>
<tr>
<th>Dictionary forms</th>
<th>Naturalistic data</th>
<th>Learning data of hearing students</th>
<th>Folk etymology</th>
</tr>
</thead>
<tbody>
<tr>
<td>• A record of common and variant forms of 1,467 HKSL vocabulary.</td>
<td>• A record of HKSL signers narrating (12 narrators) or conversing with each other (6 pairs)</td>
<td>• A lesson-by-lesson record of hearing students learning HKSL (192 hours)</td>
<td>• Cultural knowledge about the origins of their signs (etymology)</td>
</tr>
<tr>
<td>• Reference resource for community use</td>
<td>• Record of HKSL usage in Deaf community</td>
<td>• Reference resource for teaching and learning</td>
<td>• Documenting “oral” history of the Deaf community throughout the years</td>
</tr>
</tbody>
</table>
Underpinning Research

Handshape detection machine learning model

• **Objective**: Develop a handshape detection algorithm for HKSL using machine learning techniques.

• **Methodology**: Trained a machine learning model on the collected 978 citation signs of HKSL (see videos below).
Underpinning Research

Handshape detection machine learning model

- **Results**: Rapid and correct recognition of handshape, one of the most important components of sign language words.
- **Implications**: Lays the groundwork for a comprehensive sign language detection model.
Detailed of Impacts Achieved

Enhancing digital literacy

• During research, we invited 38 elderly Deaf people to provide data from the Deaf perspective (June – Sep 2023).

• Through recruiting elderly Deaf community members to get engaged in research, we encouraged a sense of ownership of HKSL.

• The elderly Deaf people, who rarely use a computer, also learnt new skills in digital literacy.

• This activity empowered Deaf individuals to utilize digital technology and overcome barriers in a hearing-dominated society.
Details of the Impact Achieved

**HKSL education**

- The accuracy of the handshape detection model has been enhanced through the incorporation of additional sign data from learners.

- Through a case study involving four learners with a total of 192 hours of longitudinal HKSL learning (Nov 2022- Aug 2023), our model has significantly improved the quality and effectiveness of teaching and learning by enhancing the detection and diagnosis of errors in L2 sign data.
Details of the Impact Achieved

HKSL translation & interpretation

• The model serves as a foundation for providing practical assistance in training sign language translators and interpreters.

• Six HKSL learners from this exercise worked as translators and interpreters at the "Point Line Mean" exhibition (Mar 2024), which featured art pieces from the Deaf community.
Detailed of Impacts Achieved

Workshops & Exhibitions

• The docents were present in workshops hosted by the artists of the Point Line Mean exhibitions (Mar – Apr 2024).
• The workshops provided an interactive experience for 360 public members to experience and understand Deaf culture.
• With the help of the docents, the Deaf artists communicated with the audience using HKSL, providing an opportunity or the hearing public to be exposed to HKSL.
Detailed of Impacts Achieved

**Documentary film production**

- With the support from Hong Kong Arts Development Council, a documentary about Deaf parents and their children “Bridge of Signs”, has been produced.

- The documentary highlights the marginalization of the Deaf community, and how Deaf parents and CODA (Children of Deaf Adults) navigate through a world of sounds and noises.

- 200+ members of the public attended a public screening of "Bridge of Signs" (Apr 2024).
Detailed of Impacts Achieved

First aid help for the Deaf

• We put our HKSL training to use in volunteering work for the benefit of the Deaf community.

• The HKSL training provided through our project enabled us to provide first aid services at two football matches organized for the Deaf by the Hong Kong, China Sports Association of the Deaf (HKCSAD) (Jan & Mar 2024).
Knowledge to be Exchanged

• The challenges faced by HKSL on multiple fronts can be summarized as:
  1. **Lack of documentation** and literature on the language
  2. **High learning threshold** due to historical lack of support
  3. **Ableism** (the idea to mold the Deaf to be more like the hearing) and the Deaf stigma
  4. **Lack of inheritance** until recent years

• Our project’s multifaceted approach which addresses these issues:
Knowledge to be Exchanged

Beneficiaries

• Native users of HKSL will benefit from the enhancement of social awareness of HKSL, which will promote inclusivity and understanding.

• HKSL interpreters and translators will be able to utilize the HKSL detection model in sign language training, enhancing their skills and accuracy.

• Hearing learners of HKSL will benefit from the HKSL detection model, as it can assist in better diagnosing their learning trajectories and providing personalized instruction.

• The global technological community working on sign language and gesture detection model development will benefit from our input data and sources, which can contribute to advancements in their model and algorithm development efforts.
This project is made possible by

CHEN, Chuwen Joanna (Undergraduate Research Assistant)
CHEN, Fei Peng Kevin (Undergraduate Research Assistant)
CHEN, Pui Ching Rachel (Undergraduate Research Assistant)
CHIK, Wing Cheung Aaron (Lab Manager)
CHUNG, Yu Hei Hannah (Undergraduate Research Assistant)
Prof. DO, Youngah (Principal investigator)
KAM, Yeuk Lam Cynthia (Professional HKSL Interpreter)
KI, Clarissa (UCL Undergraduate Research Intern)
KONG, Wan Ki KK (HKSL educator and consultant)
LIANG, Xin Olivia (Undergraduate Research Assistant)
NG, Chui Yin Judy (Undergraduate Research Assistant)
NGAI, Yu On Mavies (Undergraduate Research Assistant)
Dr. SEVILLA, Robert Marcelo (Postdoc researcher)
TAN, Lihui Frank (Postgraduate student)
Dr. THOMPSON, Arthur L (Postdoc researcher)
ZHENG, Shuang Ivy (Postgraduate student)
WANG, Kai Fung (HKSL educator and consultant)
YIP, Wing Tsun Jeff (Undergraduate Research Assistant)
and the Deaf community