



## Research from Prof. LI Ping's team reveals significant effects of onscreen instructors during video lectures in aiding student learning



Prof. Li (middle) and his researchers Yingying Peng (left), and Chanyuan Gu (right)

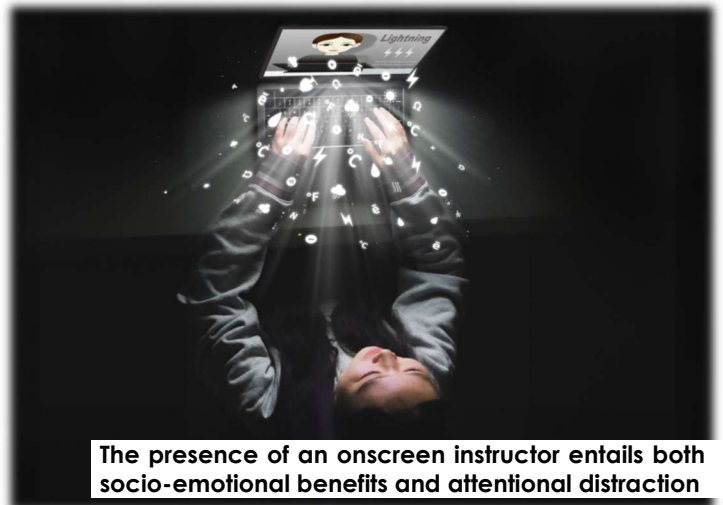
Online learning has become “the new normal” of education since COVID-19 severely disrupted face-to-face teaching activities. Researchers from The Hong Kong Polytechnic University (PolyU) have conducted a study to analyse whether and how the instructor's presence in online video lectures affects student learning and learning outcomes. The results reveal that students are more motivated to perform socio-emotional and cognitive processing when an instructor, human or animated, is present onscreen, hence facilitating more effective learning. The study findings have been published in the journal *Proceedings of the National Academy of Sciences*.

Previous behavioural studies have indicated that socio-emotional cues, such as human facial expressions and gestures, help students understand and stay focused on learning content. Led by **Prof. Ping Li**, Dean of the Faculty of Humanities and Sin Wai Kin Foundation Professor in Humanities and Technology at PolyU, the research team studied how learners respond to online learning with different types and levels of instructor presence by examining multimodal data of students' learning performance, real-time brain activity and eye movement, as well as the association between these measurements.

Eighty-one PolyU students participated in the experiment where some of them watched video lectures with a human instructor accompanying the lecture slides, some watched the same video lectures with an animated instructor, and still some watched the lectures with no onscreen instructor and only the lecture slides. This was followed by a set of assessments of how effectively they had learned about the video lectures.

Compared with the no-instructor group, students with an onscreen instructor performed significantly better in the post-course assessments, while the exact embodiment of the instructor—real vs animated—did not significantly affect the overall scores. The results provide strong and important evidence that the instructor's image, human or animated, improves educational outcomes in the video lecture setting.

The researchers examined the impact of instructor's image on learning through a combination of functional magnetic resonance imaging (fMRI) and eye-movement tracking of the students as they watched the lectures. While students with an instructor performed better, the eye-tracking results, showed that the human instructor may actually distract the students more from the slides, as more time was spent by students looking at the slides when the instructor was absent or was an animation.

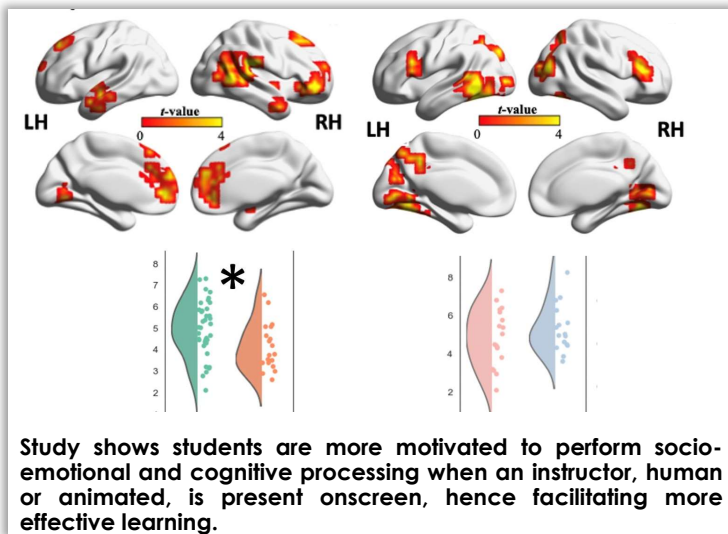


The presence of an onscreen instructor entails both socio-emotional benefits and attentional distraction

A deeper analysis of the eye-tracking data resolved this contradiction. Crucially, the synchronisation of eye movements—the extent to which the students shifted their gaze in unison—was higher in instructor-present groups than in the no-instructor group, and better-performing students also displayed more synchronised eye movements than the lower performers. This suggests that although an instructor's image may distract students from the slides, it is also more likely in guiding them to pay attention to the appropriate parts of the onscreen content. In other words, students with an instructor tend to focus on the same places, while those without an instructor are more random in their focus.

The fMRI results, which identified the brain regions students actively used during learning, aligned with the eye-tracking data. Just as their eye movements were synchronised, so did the students with an instructor show greater synchrony in the activity of brain regions crucial for learning, including regions involved in working memory and

mentalising. This alignment can be attributed to the higher level of cognitive and socio-emotional processing motivated by the onscreen instructor that served as a social cue. Under this condition, learners follow the visual content in the video more closely, allocate attention more proactively and ultimately learn better.



As the data suggest that an onscreen instructor's image entails both socio-emotional benefits and attentional distraction unrelated to learning, the researchers further propose a trade-off hypothesis suggesting learning outcome depends on whether the benefits can outweigh the costs brought by the distraction.

\* Read more: <https://polyu.me/3ITCfMs>

\* Published in *Proceedings of the National Academy of Sciences* (<https://www.pnas.org/doi/10.1073/pnas.2309054121>)

While the trade-off also relies on a learner's ability to leverage socio-emotional processing and attention control for learning, it explains the individual difference in student learning under the same video lecture setting.

Prof. Li remarked, "Although the pandemic has subsided, online learning through the use of multimedia instructional videos continues to shape education. Our findings suggest that an onscreen instructor—even an animated one—can make up for some deficits of the online learning setting, where socio-emotional cues are less salient and cognitive engagement is harder to sustain. This contributes to the development of an evidence-based instructional design for multimedia learning, thereby enhancing student's learning experience and outcome."

### **Prof. LI Ping**

**Sin Wai Kin Foundation  
Professor in Humanities  
and Technology**

**Department of Chinese  
and Bilingual Studies**



## **Introducing UBSN's equipment update**

### **MRI-compatible Foot Pedal response device**



Current Designs' fMRI **Foot Pedal** response device is non-magnetic, non-electronic, and entirely made out of plastic. So, it will not add noise to the images, nor will it raise safety concerns in the MR/MEG room or similarly demanding environments.

#### **Specifications:**

- Response device for the FIU-932 and Birch interfaces
- Center-to-center pedal spacing of 9", but this can be adjusted.
- Each pedal stands independently.
- Independent foot pedal dimensions: 4.375" high, overall height 5.5"; 1.75" wide
- Base of each pedal is 3.6" by 1.875"

#### **Officer-in-charge:**

Dr. Celia DONG ([celia.dong@polyu.edu.hk](mailto:celia.dong@polyu.edu.hk))



### **Short-distance Detectors for fNIRS**

The 8-channel **Short-distance Detectors** can provide information of signals from non-interest sources. During the collection of fNIRS signals from targeted brain regions, there are superficial confounding signals from the scalp, such as cardiac changes. Short-distance detectors are able to detect these superficial signals and help to identify and remove the confounding signals from the fNIRS data. The measures of the targeted regions can be more accurate after data cleaning.

#### **Specifications:**

- Default distance = 8 mm
- Compatible with all NIRx instruments
- 8 short-distance channels occupy one detector channel

#### **Officer-in-charge:**

Dr. Tommy LAM ([lh-tommy.lam@polyu.edu.hk](mailto:lh-tommy.lam@polyu.edu.hk))

More information on UBSN equipment: <https://www.polyu.edu.hk/ubsn/facilities/equipment/>



# Congratulations to the winners of UBSN Best Paper Award 2024!

UBSN is pleased to announce the results of the UBSN Best Paper Award 2024. This award is to acknowledge and honour UBSN users for their outstanding papers published in academic journals in the past year. The aim is to promote neuroscience research and help advance the quality of research conducted by UBSN PIs.

This year, we received a remarkable number of impressive applications, and we extend our sincere appreciation to all the applicants. After a rigorous evaluation process by our panel of judges from the UBSN Management Committee, we are delighted to

announce the winners of Gold, Silver, and Bronze Awards. The winners have showcased outstanding research accomplishments by utilising UBSN equipment.

Let us congratulate the following winners and their innovative research!

Award	Winner	Paper Title	Journal
Gold	<b>Prof. Kenneth FONG</b> (Department of Rehabilitation Sciences)	Priming Intermittent Theta Burst Stimulation for Hemiparetic Upper Limb After Stroke: A Randomized Controlled Trial	Stroke
Silver	<b>Dr. Yvonne HAN</b> (Department of Rehabilitation Sciences)	Effects of multisession cathodal transcranial direct current stimulation with cognitive training on sociocognitive functioning and brain dynamics in autism: A double-blind, sham-controlled, randomized EEG study	Brain Stimulation
Bronze	<b>Prof. Lei SUN</b> (Department of Biomedical Sciences)	Modulation of deep neural circuits with sonogenetics	PNAS

## Celebrating UBSN Open Day 2024

### Event Highlights of UBSN OPEN DAY 2024



#### UBSN OPEN DAY

UBSN held its first-ever Open Day on 4<sup>th</sup> May 2024. Distinguished keynote speakers, plenary speakers, and fellow academics were invited to participate at the event.

#### OPENING CEREMONY

The event kicked off with an introduction by UBSN Director **Prof. Marco PANG**



#### KEYNOTE SPEAKERS

We were very lucky to have **Prof. GAO Jia-Hong** (Peking University) and **Prof. QIU Anqi** (HK PolyU) who gave us their expertise on their impactful neuroscience research projects.

#### PLENARY SPEAKERS

We were thrilled to have **Prof. SUN Lei**, **Dr. Bolton CHAU**, and **Dr. Yvonne HAN** from HK PolyU who shared with us their insights from their innovative research.



#### BEST PAPER AWARD 2024

To acknowledge and honour UBSN users for their outstanding published work, three winners came out on top after rigorous evaluation by the UBSN Management Committee. Huge congratulations to **Prof. Kenneth FONG**, **Dr. Yvonne HAN**, and **Prof. SUN Lei**!



#### UBSN LAB TOURS

We had the pleasure to open our facilities for visitors at UBSN. Our scientific officers exchanged valuable discussions with academics, educators and visitors of diverse backgrounds.



#### SUPPLIERS' PARTICIPATION

High quality research apparatuses at UBSN are sourced from major scientific equipment distributors.

#### SOUVENIRS

To commemorate this special occasion, UBSN gave out a total of 8 kinds of souvenirs!



#### REFRESHMENTS

Visitors discussed their scientific interests and expertise during break, while enjoying our selection of pastries, Chinese snacks, and tea and coffee.

#### CLOSING CEREMONY

The event was full of fruitful scientific discussions and was concluded by UBSN Associate Director **Prof. Li Ping**.



#### GOING FORWARD

UBSN hopes to regularly bring useful knowledge to users and inspire innovative research at PolyU. Please visit our website and follow us on Instagram for more news and events! We hope to see you again soon!





## Recent events at UBSN

In April, UBSN arranged a seminar titled "NIRSport short-distance channels", providing a live demo showcasing how measuring short-distance channels can enhance functional near-infrared spectroscopy (fNIRS) results. We held a Capacity Building Scheme seminar with Dr. Pearl CHEN who gave us a seminar titled "Introduction of Functional Magnetic Resonance Imaging (fMRI): An Update". We also had the honour to welcome visitors of the Philomathia Foundation to UBSN.



Workshop

### NIRSport Workshop

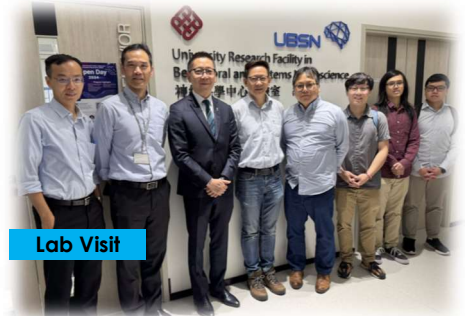
Instructor: HONG KONG HANIX UNITED INTERNATIONAL TRADING LTD.



Seminar

### MRI Seminar (Capacity Building Scheme Seminar)

Speaker: Dr. Pearl CHEN

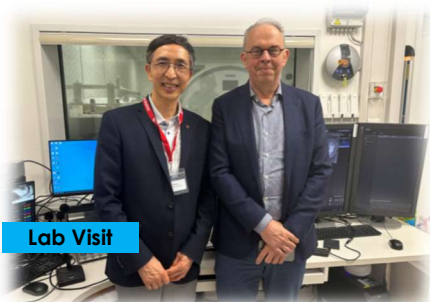


Lab Visit

### Visitors of the Philomathia Foundation

In May, UBSN held its first-ever open day!

UBSN also had the privilege of welcoming Prof. Peter HAGOORT to visit our facility. We also received visitors from The University of Hong Kong - Shenzhen Hospital and Guangzhou Medical University. May is wrapped up by Dr. Grace XIE, who gave us a seminar titled "Automatic Segmentation of White Matter Hyperintensities from Brain Magnetic Resonance Images-Does AI Model Perform Better", supported by our Capacity Building Scheme.



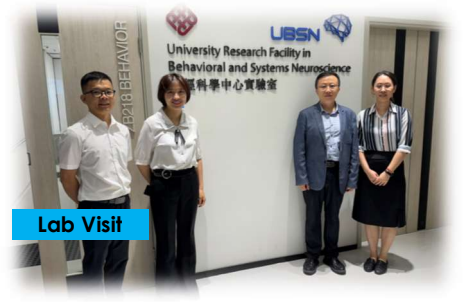
Lab Visit

### Prof. Peter HAGOORT visiting UBSN



Lab Visit

### Visitors from The University of Hong Kong - Shenzhen Hospital



Lab Visit

### Visitors from Guangzhou Medical University



Seminar

### MRI Seminar (Capacity Building Scheme Seminar)

Speaker: Dr. Grace XIE

At UBSN, we hope to bring users useful knowledge regularly and inspire more innovative research at PolyU.

If you have any requests or suggestions on an equipment, please drop us a message!

For more UBSN news and events, visit our website:

<https://www.polyu.edu.hk/ubsn/news-and-events/>

## Upcoming Events at UBSN

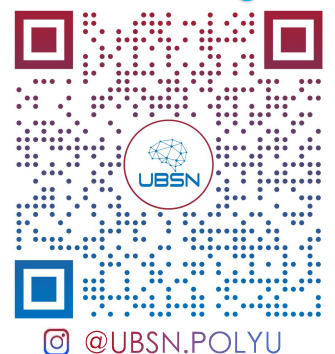
A selected piece of UBSN equipment is featured every few months.

Starting the next bimester, UBSN will host seminars and workshops featuring **Human behaviour** equipment e.g. fNIRS, TMS, EEG, etc.

Stay tuned by checking out our website:

<https://www.polyu.edu.hk/ubsn/news-and-events/>

Follow on Instagram:



@UBSN.POLYU

Have any questions? Interested in using our equipment? Please contact us!

Website: <https://www.polyu.edu.hk/ubsn>

E-mail: [ubsn.enquiry@polyu.edu.hk](mailto:ubsn.enquiry@polyu.edu.hk)