

# Dr. Caicai ZHANG's MRI Study on Children's Learning and Memory Patterns



Dr. Caicai ZHANG's research at UBSN MRI facility

When it comes to MRI scans, children are known to be less cooperative. Lying alone inside an MRI scanner can be a scary experience. Albeit difficult, in order to establish full understanding of the developing brain, it is necessary to obtain high-quality brain scans from neurotypical children as well as children with various kinds of brain abnormalities, such as developmental language disorders. Mock MR, which has been widely used in many MRI centers, is a useful tool for researchers to obtain high-quality MRI data from non-sedated child participants. Simulating the real MR experience, Mock MR helps researchers to prepare and accustom children to the exotic and claustrophobic scanner environment expecting minimal body motion.

study funded by the MOST "Sci-Tech Innovation 2030 – Brain Science and Brain-like Research Major Project" Young Scientist Scheme, she and her team is tracking brain, language, long-term memory, and sleep changes in healthy children for five years from 3 to 7 years old. The aims are two-fold: (1) to create brain charts for typically developing 3-7 years old children, and (2) to identify early neural, cognitive and sleep factors that can predict later language development and disorders. She employs a multimodal approach, combining MRI, EEG and sleep studies to address these questions. Mock MR is especially valuable for ensuring high-quality MRI data from young children. These results will lay the foundation for early screening and identification of children with developmental disorders of language to maximize the benefits of intervention. In addition, by probing the predictive effect of sleep on long-term memory and language development, the findings may inform sleep policies for Chinese children in this age range.



Experimental setup at the UBSN MRI bore

Dr. Caicai Zhang's research focuses on typical brain growth and neurocognitive substrates of developmental disorders of language in Chinese children. In a longitudinal



Young children's learning behaviour



**Young children participating at behaviour tasks**

In another study funded by the PolyU Project of Strategic Importance Scheme, she and her team are using MRI and cognitive tasks to address a significant gap in our understanding of the neurocognitive substrates of developmental disorders of language. Common developmental disorders of language include developmental stuttering, developmental language disorder and developmental dyslexia. Each of these disorders affects a significant portion of children; they also co-occur often. However, their neurocognitive bases and relationships with each other are not well-understood. Crucially, this has stymied the development of effective evidence-based diagnostic and therapeutic approaches.

Dr. Zhang and her research team use an interdisciplinary, theory-driven approach to study how the procedural and declarative learning circuitries, including the basal ganglia, cerebellum, medial temporal lobe, frontal lobe, and associated circuitries, contribute to typical and atypical speech, language, and literacy development in Chinese children. Mock MR plays an essential role by preparing the children for the actual MRI scanning. These findings will lay the foundation for the establishment of multi-evidence-based diagnosis and intervention approaches, with the potential to benefit many children affected by these disorders.



**Dr. Caicai ZHANG**  
**Associate Professor**  
**Department of Chinese and**  
**Bilingual Studies**

## **UBSN's new Mock MR System**

The mock MR system is designed to provide participants an experience similar to what they will experience in the real MRI scanner. It includes a moving table, a realistic head coil, equipment for audio presentation of scanner noise, visual and audio stimulation system, and a set of button boxes for participants responses.

### **Features and Specifications:**

- The mock MR system equips with air circulation fan, lighting strip, and monitoring system in cavity.
- The mock MR system provides scanning noise simulator, electric bed feeding control system, auxiliary laser positioning, and mock head coil.
- The mock MR system delivers Visual & Audio stimulation to human subjects.
- The mock MR system is able to monitor and train the head movement.

### **Applications:**

- Acclimating participants to the MRI environment
- Training participants for in-scanner tasks

### **Location:**

ZB220

### **Equipment in-charge:**

Dr. Celia DONG

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More information UBSN's MRI equipment: <https://www.polyu.edu.hk/ubsn/news-and-events/>

# Director of UBSN, Prof. Marco Pang, receives International Service Award in Research at World Physiotherapy Congress 2023

Congratulations to **Prof. Marco Pang**, on receiving the **International Service Award in Research** at the recent **World Physiotherapy Congress 2023** held in Dubai.

Prof. Pang is our director here at University Research Facility in Behavioral and Systems Neuroscience (UBSN) and a Professor in the Department of Rehabilitation Sciences. Prof. Pang is the **first** physiotherapist from Hong Kong to ever receive this highly distinguished recognition.

The World Physiotherapy awards are presented every four years. The World Physiotherapy International Service Award in Research in particular honours individuals who have demonstrated leadership, made distinguished contributions and/or have had high impact through physiotherapy research locally and/or internationally.

Prof. Pang was one of four outstanding physiotherapists from all around the world to receive the award this year. The president of World Physiotherapy, Prof. Emma Stokes, presented his award and praised his outstanding research accomplishments and commitment to the advancement of physiotherapy research field.



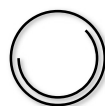
UBSN would like to once again congratulate Prof. Pang on his success and thank him for his dedication in physiotherapy service and research.

Learn more:

<https://world.physio/team/2023-awards-recipients/>



## PolyU develops tDCS treatment for relieving symptoms in Autism Spectrum Disorder



One of our UBSN members, **Dr. Yvonne HAN** from Department of Rehabilitation Sciences, has recently reported regarding **her transcranial direct current stimulation (tDCS)** study.

Her research team randomly sampled 41 young people, aged from 14 to 21, with mild **Autism Spectrum Disorder (ASD)**. They performed 10 times tDCS treatments at frontal lobe within two weeks. The results were found that the tDCS treatments, combining with cognitive training, may help facilitating the social communication skills and various cognitive functions of the young people with ASD. Dr. Han suggested that this enhancement may be due to the facilitation effect of tDCS on synaptic plasticity and neuronal network connection. She will further explore the effectiveness of tDCS stimulation as a booster or continuous treatment, as well as the feasibility of conducting tDCS treatment at home.

More online coverage:

- Oriental Daily News - <https://polyu.me/40ZMS1s>
- Ming Pao Daily News - <https://polyu.me/40ZGEyL>
- Hong Kong Economic Times - <https://polyu.me/3xoAS13>
- Sing Tao Daily - <https://polyu.me/3k2p0JY>
- am730 - <https://polyu.me/3EBhvkz>
- Ta Kung Pao - <https://polyu.me/3lx6za0>
- Yahoo HK - <https://polyu.me/410sYUc>

## Recent events at UBSN

UBSN has held a number of successful workshops and seminars in the first half of 2023, with the help from other researchers and scientific equipment companies. Here is the summary:

### UBSN Workshop: Interleaved functional Magnetic Resonance Imaging-Transcranial Magnetic Stimulation (fMRI-TMS)

**UBSN Workshop**  
Interleaved functional Magnetic Resonance Imaging-Transcranial Magnetic Stimulation (fMRI-TMS) workshop  
Date: 03 March 2023  
Time: 9:00 am - 1:00 pm (Lecture) 2:00 pm - 5:20 pm (Lab Visit)  
Venue: Z209 (Lecture) ZB216 (Lab Visit)

**Topic:**  
9:00 am Introduction of Basic TMS  
10:00 am fMRI application in research  
11:00 am fMRI-TMS application in research and clinical  
12:00 pm Round discussion in TMS for psychiatric disorders

**Speakers:**  
Mr. Matthias Kienle (Head of International Business Development at MagVenture)  
Mr. Philo Lu (Research Collaboration Scientist in Siemens Healthineers)  
Dr. Georg Kranz (Assistant Professor in Rehabilitation Sciences, PolyU HK)

#### Seminar

Date: 03 Mar 2023  
Time: 9:00am-1:00pm  
Venue: Z209

#### Speakers/ instructors



**Mr. Matthias KIENLE**  
Head of International Business Development at MagVenture



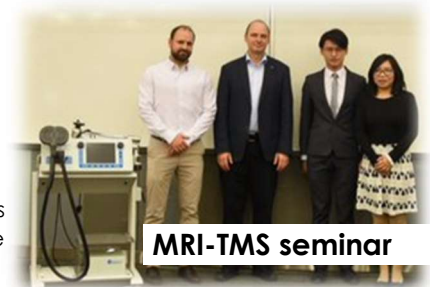
**Mr. Philo LU**  
Research Collaboration Scientist in Siemens Healthineers



**Dr. Georg KRANZ**  
Assistant Professor in Rehabilitation Sciences, PolyU HK

#### Lab demo

Date: 03 Mar 2023  
Time: 2pm-5:20pm  
Venue: ZB216



MRI-TMS seminar



MRI-TMS lab demo

### “EEG and NeuroScan CURRY 9” Training Workshop

**UBSN Workshop**  
“EEG and NeuroScan CURRY 9” Training Workshop  
Date: 29 - 31 March 2023  
Time: 9:00 am - 5:30 pm  
Venue: M1603

**Topic:**  
Introduction to EEG (EEG) signal processing  
Advanced signal processing  
Sensor analysis  
Image processing  
Data acquisition  
Classification  
Classification of results

**Speakers:**  
Mr. Reyko Tech (Software developer, Compumedics Neuroscan)  
Dr. Fernando Gasca (Software developer, Compumedics Neuroscan)

#### Workshop

Date: 29-31 Mar 2022  
Time: 9:00am-5:30pm  
Venue: M1603

#### Speakers/ instructors



**Mr. Reyko TECH**  
Software developer, Compumedics Neuroscan

Co-sponsored by:  
**Tronda Electronics Ltd.**



**Dr. Fernando GASCA**  
Software developer, Compumedics Neuroscan



EEG CURRY workshop

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 equipment, please drop us a message!

For upcoming events at UBSN, stay tuned to <https://www.polyu.edu.hk/ubsn/news-and-events/events/>

## Upcoming Plans at UBSN

We have heard your feedback! Starting this year, UBSN plans to organise more regular events, such as:

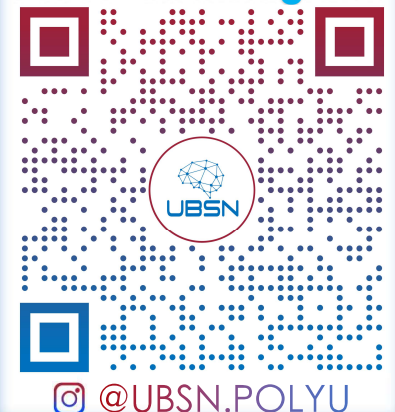
1. lab visits,
2. workshops,
3. seminars,
4. orientations to our facilities, etc

Have an equipment in mind you would like to know more about? Let us know!

More information will be ready in our next newsletter issue. Schedules will be also posted digitally so make sure you follow us. We look forward to seeing you at UBSN!

Up-to-date news or events can be accessed on our website: <https://www.polyu.edu.hk/ubsn/news-and-events/news/> and <https://www.polyu.edu.hk/ubsn/news-and-events/events/>

Follow on Instagram:



@UBSN.POLYU

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

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

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