1. Miss Manyu WANG

PhD in Medical Sciences

Department of Medicine and Therapeutics

Faculty of Medicine

Bridging the Species Gap: A Humanized LRRK2 Mouse Model for Parkinson's Studies

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Parkinson's disease (PD) is a debilitating condition that affects millions worldwide, gradually impairing movement, coordination, and quality of life. While the exact causes of Parkinson's remain unclear, certain genetic mutations in a protein called LRRK2. have been linked to an increased risk of developing the disease. Intriguingly, these mutations vary across populations, with some linked to earlier or more aggressive forms of Parkinson's in specific groups. To explore how these mutations contribute to the disease, we developed a transgenic mouse model that carries the human version of the LRRK2 gene with Parkinson's-related mutations. This model allows us to mimic some aspects of the disease and study its underlying mechanisms in a way that wasn't possible before. Our research has shown that mutant LRRK2 can interfere with key cellular processes, including the function of RAB proteins—molecules that act like traffic controllers within cells. Disruptions in this system may contribute to the breakdown of important processes like waste clearance and nutrient transport in brain cells. Additionally, we observed subtle changes in pathways related to neuron communication and stress management in the brains of our mice. Our mouse model serves as a foundational tool for investigating the role of LRRK2 mutations in Parkinson's and could eventually help researchers develop better treatments. By bridging the gap between genetics and disease, we're contributing to a brighter future for those affected by Parkinson's.

2. Mr Chun Keung PANG

PhD in Biomedical Sciences

School of Biomedical Sciences

Faculty of Medicine

Engineered probiotics as the next-generation vaccine for infectious diseases

Probiotics are well-established for maintaining gut microbiome health and balance. Scientists are now expanding their utility through genetic modification, with one promising application being oral vaccines. Unlike traditional vaccines requiring invasive administration and cold-chain transport, probiotic vaccines offer simplified manufacturing through routine culturing, potentially addressing global vaccine inequity and injustice.

This study demonstrates that Lactobacillus, a common lactic acid bacteria in fermented foods, can be genetically engineered to express a potent malaria antigen. When administered orally to mice, these modified probiotics successfully triggered protective antibody (IgM) production against malaria. This proof-of-concept validates that probiotic-based vaccines can effectively stimulate immune responses through oral delivery.

Importantly, a microbiome analysis of the experiment rodents revealed that while the gut bacterial diversity changed following immunization with the genetically modified probiotics, these alterations were reversible. This finding provides valuable insights into the safety profile of long-term GM probiotic consumption, addressing a key concern for their future clinical application.

The implications extend beyond malaria prevention. This platform technology could be adapted for various infectious diseases, particularly in resource-limited settings. Future research will explore efficacy in disease-challenge models and optimize antigen expression systems for human applications. As regulatory frameworks evolve for genetically modified organisms in healthcare, these engineered probiotics represent a significant advancement in vaccine technology with potential for global health impact.

3. Miss Yuhong LIN

PhD in Food and Nutritional Sciences

School of Life Sciences

Faculty of Science

Investigating the Effects of Houttuynia Cordata Thunb. on Plasma Cholesterol and Gut Microbiota in Hypercholesterolemic Hamsters

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Hypercholesterolemia leads to cardiovascular diseases and atherosclerosis. Previous studies have highlighted the crucial role of gut microbiota in alleviating atherosclerosis progression and reducing plasma cholesterol. However, the protective effects of Houttuynia Cordata Thunb (HCT), a well-known fishy Chinese herb, against hypercholesterolemia and vasculopathy remain largely unknown. This study aims to explore the effects of HCT extracts on vascular health and gut microbiota in golden Syrian hamsters with hypercholesterolemia. The hypercholesterolemia hamster model was established by feeding with a high-cholesterol diet. Aqueous or ethanolic HCT extracts were mixed with diet and concurrently given to hamsters for six weeks. Plasma lipid profiles were evaluated. Aortas were collected to detect fatty streak areas. Feces were collected to analyze the abundance of microorganisms in the gut microbiota. HCT ethanolic extract treatment remarkedly decreased plasma levels of total cholesterol and high-density lipoprotein cholesterol in hypercholesterolemic hamsters. Notably, both aqueous and ethanolic extracts of HCT dose-dependently reduced atherosclerotic plaques in hamsters fed with a high-cholesterol diet. Strikingly, the effects of HCT ethanolic extract in reducing atherosclerotic plaques are better than aqueous extract. Furthermore, at the phylum level, the relative abundance of Firmicutes decreased in hamsters treated with aqueous and ethanolic extracts of HCT. By contrast, the abundance of Bacteroidetes was increased by HCT treatment. At the family level, HCT extract favourably modulated the relative abundance of Porphyromonadaceae and Bacteroidales_S24-7_group. These findings indicate that HCT extracts may facilitate the growth of short-chain fatty acids-producing bacteria to alter gut microbiota composition, contributing to the reduction of plasma lipid levels. This study offers evidence demonstrating the effects of HCT extracts on alleviating atherosclerosis and lowering plasma cholesterol levels in the male hypercholesterolemic hamster model, offering novel insights into the pharmacological effects and promoting the application of HCT.

4. Ms Elizabeth Edith CHUNG

PhD in English (Literary Studies)

Department of English

Faculty of Arts

"A glittering constellation of unique literary voices": Contemporary Hong Kong Literary Arts and Communitas

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This doctoral thesis examines the importance of community in the production of and experimentation with contemporary Hong Kong literary arts. Thereby, I argue that the combination of experimentation and communitas is a key lens through which we can understand contemporary Hong Kong literary arts.

In three chapters focussing on the genres of creative nonfiction, poetry, and theatre, the use of experimentation as supported and encouraged by relevant communities is analysed through the lens of communitas, a form of community that widens accessibility, preserves and maintains a sense of individuality, and consequently increases both the sense of and actual power to act. Alongside critical and literary analysis, this study incorporates the use of literary interview as part of its methodology to elucidate the experiential aspects of community, reveal its conscious impact(s) on literary experimentation and production, and gain insight into the active process of this experimentation and production.

5. Miss Zilin SONG

PhD in Earth & Environmental Sciences

Department of Earth and Environmental Sciences

Faculty of Science

From Microseismicity to Volcano Eruptions: Near-field Triggers of the 2018 Eruption at Sierra Negra Volcano, Galápagos Islands

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Large earthquakes near volcanoes are known to trigger eruptions, which usually have a delay ranging from hours to weeks. While the time delay provides a crucial window for hazard assessments, the underlying mechanisms driving this process remain poorly understood. In 2018, Sierra Negra Volcano erupted approximately 10 hours after a magnitude 5.4 earthquake struck its caldera. By analyzing seismic waveforms recorded on the day of eruption onset using machine learning and template matching techniques, we enhanced manual earthquake records with sequences of repetitive microseismicity along the northwestern caldera. These events, potentially caused by magma or fluids activities, initiated 2 hours after the M5.4 earthquake and persisted for 6 hours, indicating sustained stress perturbations in the area. Significantly, there is no surface deformation detected until the perturbation temporally ceased. Continuous GPS data then revealed magma moving underground, culminating in an eruption within 3 hours. These processes, revealing specifically how a near-field large earthquake can "wake up" a volcano, indicate that energy release by a large earthquake may not uniquely trigger eruptions. Localized stress perturbations can progressively destabilize volcanic systems and catalyze final eruptions. Moreover, our findings demonstrate that combining machine learning with traditional monitoring (e.g., GPS and satellite data) exposes hidden processes. As data analysis technologies advance, this integrated approach will further strengthen volcanic hazard assessments and ultimately improve public safety in vulnerable regions.

6. Miss Khusnur Jahan SHAPNA

PhD in Geography and Resource Management

Department of Geography and Resource Management

Faculty of Social Science

Enhancing agricultural sustainability through vermicompost: Empirical evidence from diverse environmental settings in Bangladesh

Droughts and salinization are two of the most critical climate-induced disasters prevalent in arid and coastal regions worldwide. These events have multifaceted impacts on agriculture, food security and livelihoods in the affected regions. Bangladesh, being a low-lying country, has been facing severe impacts on agriculture due to the increasing frequency of droughts and the magnitude of salinity in crop land and freshwater bodies. Understanding the role of vermicompost (a nutrient-rich organic fertilizer) in improving soil fertility and ameliorating soil salinity is of critical importance for agricultural sustainability. Examining soil nutrients and salinity from 37 field experiments for the period 2017-2023, this study explored the effects of vermicompost on soil nutrients and salinity in drought-prone and salinization-affected regions of Bangladesh. Vermicompost-utilizing experiments showed a significant increasing trend in soil nutrients (nitrogen, phosphorus and potassium) over the 7 years, while in the control experiments (chemical fertilizer-utilized plots) soil nutrient contents remained largely unchanged. Changes in cropping patterns did not show significant effects on soil nutrient contents in either region over the 7 years. In salinization-affected region, vermicompost has been found to ameliorate soil salinity from 5.56-7.65 dS/m in 2017 to 4.93-5.89 dS/m in 2023. None of the cropping patterns (brinjal-watermelon and potato-watermelon) in salinization-affected region had significant effects on the observed changes in soil salinity. These findings underscore that, regardless of different crop combinations and environmental settings, vermicompost application in nutrient-poor and salinization-affected soil can enhance soil nutrients and ameliorate salinity levels. This research offers empirical evidence to inform policy decisions that encourage sustainable agricultural practices and improve soil health using vermicompost.

7. Ms Xu HAN

PhD in Social Welfare

Department of Social Work

Faculty of Social Science

The Role of Filial Piety in Eating Pathology Among Chinese Patients with Anorexia Nervosa: A Cross-Sectional and Longitudinal Study

Anorexia nervosa (AN) is a psychological disorder characterized not by a lack of appetite or inability to eat, but by a fear of eating, often driven by concerns about weight gain. AN not only disrupts family dynamics but is also influenced by family factors. For instance, family dysfunction, such as parental anxiety, criticism, or enabling of disordered eating behaviors, can exacerbate and prolong the illness. However, family factors vary across cultural contexts. In China, filial piety—a core cultural value emphasizing family hierarchy and obligations—may play a unique role in shaping eating pathology. This study investigates the relationship between filial piety and eating pathology among Chinese AN patients.

The study was conducted in Beijing and included 154 participants, with 83 of them completing a follow-up assessment six months later. Statistical analyses primarily employed regression methods to examine the relationship between filial piety and eating pathology. Key covariates, such as patients' cognitive and emotional factors, as well as general family functioning, were controlled for to isolate the unique contribution of filial piety. Additionally, participants' treatment status during the study period was taken into account to ensure the robustness of the findings.

The findings reveal that higher levels of authoritarian filial piety (AFP), which emphasizes obedience, hierarchy, and self-sacrifice, are associated with more severe eating pathology. While some parents may believe that AFP helps maintain family order during illness, it can perpetuate disordered eating behaviors, regardless of participation in psychological interventions. Unlike family dysfunction, AFP's influence appears to be persistent and culturally embedded, making it less responsive to conventional psychological treatments. These results highlight the critical role of filial piety in eating pathology among Chinese patients and underscore the need for culturally sensitive interventions that specifically address the impact of AFP.

8. Mr Qingshuang ZOU

PhD in Chemistry

Department of Chemistry

Faculty of Science

Photo-metallo-immunotherapy: Fabricating Chromium-Based Nanocomposites to Enhance CAR-T Cell Infiltration and Cytotoxicity against Solid Tumors

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The infiltration and cytotoxicity of chimeric antigen receptor (CAR)-T cells are crucial for effective elimination of solid tumors. While metallo-immunotherapy is a promising strategy that can activate the antitumor immunity, its role in promoting CAR-T cell therapy remains elusive. The first single-element nanomaterial based on chromium nanoparticles (Cr NPs) for cancer photo-metallo-immunotherapy has been reported previously. Herein, an extended study using biodegradable polydopamine as a versatile carrier for these nanoparticles, enabling synergistic CAR-T cell therapy, is reported. The results show that these nanocomposites with or without further encapsulation of the anticancer drug alpelisib can promote the CAR-T cell migration and antitumor effect. Upon irradiation with near-infrared light, they caused mild hyperthermia that can "warm" the "cold" tumor microenvironment (TME). The administration of B7-H3 CAR-T cells to NOD severe combined immunodeficiency gamma mice bearing a human hepatoma or PIK3CA-mutated breast tumor can significantly inhibit the tumor growth after the induction of tumor hyperthermia by the nanocomposites and promote the secretion of serum cytokines, including IL-2, IFN-γ, and TNF-α. The trivalent Cr^{3+} ions, which are the major degradation product of these nanocomposites, can increase the CXCL13 and CCL3 chemokine expressions to generate tertiary lymphoid structures (TLSs) in the tumor tissues, facilitating the CAR-T cell infiltration.

9. Mr Shikai CHEN

PhD in Psychology

Department of Psychology

Faculty of Social Science

How respiration helps you speak

Speech production involves the mental process of converting thoughts into spoken words (e.g., narrating a story), encompassing steps like idea formulation, organizing these ideas into a linguistic structure or syntax, and then converting those ideas into muscle commands for speech. While various stages of speech production have been associated with distinct brain areas (e.g., Broca's area), the physiological role of breathing in speech production remains under-explored. Beyond its basic mechanical function (e.g., airflow regulation), recent evidence suggests breathing rhythms may actively coordinate with speech planning, such as the positive correlation between inhalation depth and subsequent speech envelope power. Yet whether and how breathing rhythms synchronize with and represent complex linguistic information in speech production across different timescales remains unclear. This study investigates the alignment between breathing patterns and linguistic structures during narrative speech production.

Participants are asked to narrate a pre-prepared story in Mandarin Chinese in a sound-proof room, while respiratory and speech signals are simultaneously recorded. Spectral analysis revealed distinct respiratory patterns during speech compared to rest. Critically, we found a significant coherence between the rhythms of speech production and breathing rhythms at ~0.3 Hz, alongside a consistent temporal response function linking speech envelope dynamics to respiratory activity, peaking ~390 ms before speech onset.

To conclude, these findings demonstrate that breathing patterns align with the temporal structure of sentences, suggesting an active coordination between respiratory rhythms and linguistic structures. Our results underscore breathing's role not merely as a peripheral mechanism but as a dynamic component embedded within the neural and cognitive architecture of speech production.

10. Miss Huan XIAO

PhD in Chinese Medicine

School of Chinese Medicine

Faculty of Medicine

AptaGAN: de novo generation of aptamer drugs for disease-related proteins using generative adversarial network-based deep learning approach

Aptamers are short, single-stranded nucleic acids that can bind to target proteins with high affinity and specificity. They are promising therapeutics in treating diseases such as cancer, cardiovascular diseases, and viral infections. However, aptamer drug discovery is challenging due to the high cost, time-consuming, and low success rate of conventional wet lab-based technique SELEX, which identifies targeting aptamers from a massive pool of different DNA or RNA sequences through several rounds of selection and removal processes. To address this, we proposed a computational program, AptaGAN, for the efficient discovery of aptamer drugs in silico. AptaGAN is a generative adversarial network-based hybrid model capable of de novo aptamer generation for a given protein. It comprises a Wasserstein GAN-based generator that can generate novel aptamers from Gaussian noises and a motif-based generator that can generate sequences containing aptamer motifs. It also has an XGBoost-based classifier to predict sequences' binding affinities for the target. To our knowledge, AptaGAN is the first algorithm to generate aptamers for any user-given protein without prior SELEX data. Performance evaluations revealed that it has advantages in most evaluation metrics: AUC (0.920), Accuracy (0.871), Precision (0.832), and Recall (0.768). It also outperformed state-of-the-art models in the DeepBind binding scores and generated more authentic sequences in terms of minimum free energy, GC content, and diversity. These results demonstrated that AptaGAN is superior in target-oriented generation and can assist and accelerate aptamer drug development. If put into commercial use, it may save 1 to 3 billion US dollars of annual investment and expenditure and reduce drug discovery time from a few years to a few months for pharmaceutical companies.

11. Ms Hongmei LIN

PhD in Psychology

Department of Psychology

Faculty of Social Science

Do Hearts or Actions Speak Louder? Age-Related Differences in Prosocial Evaluation

Previous research suggests prosocial behavior increases with age, but how prosocial evaluation changes with age remains unclear. The present study investigates whether older adults' prosocial evaluations are more motive- or outcome-based than younger adults', and whether the actor's age influences their judgement. Across two pre-registered studies, younger and older participants evaluated prosocial behaviors stemming from various motives (material, social, emotional, other's benefit) and resulting in different outcomes (positive vs. negative). Study 1, which did not disclose actor's age, included 155 older (54% female, Mage = 59.90, SDage = 3.88, age range 56-73) and 175 younger adults (51% female, Mage = 28.20, SDage = 3.94, age range 20-35). Study 2, which identified the actor as either younger or older, included 360 older (55% female, Mage = 59.50, SDage = 4.19, age range 56-78) and 340 younger adults (58% female, Mage = 30.40, SDage = 3.43, age range 20-35). Both studies revealed that, compared to actions driven by material and social motives that had positive outcomes, younger and older evaluators rated prosocial acts as more prosocial when motivated by emotional or other-oriented benefits, even if the outcome was negative. Furthermore, when the actor's age was disclosed, both older and younger evaluators applied similar standards in their prosocial evaluations when the outcome was positive. However, with the negative outcome, older evaluators showed a bias: they were more lenient towards older actors performing prosocial acts for social benefits compared to younger actors, but less lenient when those acts were performed for material benefits. These findings suggest a greater emphasis on motive compared to outcome. Moreover, older adults demonstrate greater flexibility in prosocial evaluations, adjusting their standards based on the actor's age and motives when negative outcomes are present.

12. Mr Yuwen WANG

PhD in Biomedical Engineering

Department of Biomedical Engineering

Faculty of Engineering

Mitochondria-Targeted Nanozymes Accelerate Bone Regeneration by Augmenting Osteogenesis in Skeletal Stem Cells

Critical-sized bone defects pose a global challenge to musculoskeletal health. Skeletal stem cells, which are indispensable cells in skeletal system development, have been shown to have enhanced mitochondrial activity during osteoblast differentiation. However, excessive accumulation of reactive oxygen species produced by bone tissue injury can lead to oxidative stress and mitochondrial damage, which can negatively affect osteogenic differentiation and tissue repair. In such an environment, the targeted removal of mitochondrial reactive oxygen species and the enhancement of mitochondrial homeostasis are imperative for optimal osteogenic differentiation. Single-atom nano-scale enzymes exhibit ultra-high atom utilization efficiency, making them highly promising candidates for applications in bone tissue engineering. The present study introduces a dendritic mesoporous silica nanoparticle (DMSN)-based nanozyme that simultaneously loads Fe and Cu single atoms and is modified with TPP to obtain triphenylphosphonium (TPP)-DMSN-Fe/Cu nanozymes with mitochondrial targeting. The promotion of osteogenesis is achieved through the scavenging of reactive oxygen species, the enhancement of mitochondrial function, and the autophagy of divided and abnormal mitochondria. In vivo experiments have demonstrated that TPP-DMSN-Fe/Cu nanozymes significantly enhance mitochondrial biogenesis, promote bone regeneration, and increase bone volume and bone mineral density. Consequently, this multifunctional nanosystem targeting mitochondria is a therapeutic strategy for bone regeneration based on mitochondrial regulation.

13. Ms Hin Hung TSANG

PhD in Environmental Science

School of Life Sciences

Faculty of Science

Biological responses and ecological roles of key intertidal engineers under global climate changes

Unprecedented changes to the global climate have been recorded over the last decade. The release of carbon dioxide by humans into the atmosphere has altered both the atmospheric and ocean temperature, leading to ocean warming. Such changes will continue, and are expected to pose metabolic costs on the marine organisms, as well as additional threats to the interspecific interactions and mix-species assemblages in the intertidal ecosystems. Bivalves such as oysters and mussels exert a strong ecological impact by providing refugia and essential food resources, while sharing similar trophic niches. Within the guild of filter feeders, rock oyster Saccostrea cucullata, alien mytilid Xenostrobus securis and green mussel Perna viridis are predicted to display different sensitivities with regard to the physiology, behaviour and feeding performance under the future climate scenarios. The differences in their relative performance under environmental modifications such as temperature stressors will be of ecological consequences as it affects the community structure and the uptake of food resources within the same trophic niche.

Specifically, I conditioned the three bivalves, S. cucullata, X. secures and P. viridis, to the future ocean warming scenarios (ambient: 25°C, elevated: 30°C). The physiology (survival, condition index, feeding rate, thermal performance), behaviour (aggregation of mussels and biodeposition) was measured during the acclimation period and compared among the three study species. The relative performance interpreted by their food resources partitioning (spatial variability of δ13C and δ15N) throughout the experiment will be examined after the acclimation period.

Together, the results of this experiment contribute to our knowledge of potential impacts of ocean warming, and provides initial insight into the responses of the sympatric intertidal bivalves to future climate conditions.

14. Miss Xueyan CAO

PhD in Communication

School of Journalism and Communication

Faculty of Social Science

How Does Disgust Affect Mpox Prevention? Examining the Underlying Mechanisms of Perceived Severity and Perceived Susceptibility Moderated by Stigma

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The study aims to examine the influencing mechanism of incidental exposure to Disgusting Graphics Information (DGI) about Monkeypox (Mpox) on the intention of prevention behavior. This study first investigates the components of disgust and then examines the mechanism of disgust's influence. The study uses a cross-sectional survey design among respondents who have been incidentally exposed to DGI about Mpox (N = 368). The results showed that disgust toward Mpox is the most effective component among other proposed ones (disgust toward graphics, information sources, and patients). Disgust not only positively influences prevention intention, but also indirectly influences prevention intention through perceived severity rather than perceived susceptibility. Moreover, moderated mediation was found, indicating that stigma toward patients prevents people from adopting preventive behaviors. Both theoretical and practical implications are discussed.

15. Miss Provides NG

PhD in Architecture

School of Architecture

Faculty of Social Science

Digital Common(s): The Role of Immersive and Gamification Technologies in Public Space Co-design

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Participatory design (co-design) positions stakeholders as active collaborators in shaping inclusive urban solutions, yet systemic barriers persist in high-density, digitised contexts such as Hong Kong. While community-driven approaches counter top-down planning paradigms, inequities emerge in translating technical expertise into accessible processes for marginalised groups, including public housing residents and older adults. Emerging technologies such as virtual reality (VR) and gamification offer novel pathways to bridge knowledge gaps through interactive visualisation, but risks of exclusion and skill disparities remain.

The study interrogates these tensions through a Participatory Action Research (PAR) framework, involving local stakeholders to ensure outcomes align with their needs: How can immersive and gamification tools be effectively integrated into co-creation processes so as to enhance citizen participation in public space design? Case study workshops were organised, inviting residents, social workers, and designers to co-create local open spaces using a custom VR sandbox game, and iteratively feedback to enhance engagement methodologies.

Key findings reveal: (1) Combinatorial creativity within technical constraints, where modular game parts enabled hybrid spatial configurations, yet design thinking was circumscribed by VR's embedded technical conventions. (2) Process versus product, as participant motivation correlated more with relational dynamics and learning satisfaction, challenging output-centric rubrics. (3) Intergenerational trade-offs, where age-diverse teams produced contextually relevant designs but exhibited diminished risk-taking innovation, prioritising harmony over experimentation. (4) A paradox in universal design: ostensibly neutral solutions risk homogenising space, marginalising neurodivergent and hyperlocal needs, critiquing the illusion of neutrality in design standards.

The study advocates reimagining universality as an inclusive framework negotiating collective usability with intersectional equity. It contributes to citizen participation in technology-driven decision-making, highlighting open-source platforms as counterweights to proprietary models. By framing urban commons as redistributive socio-technical systems, the research underscores iterative participation and processual responsiveness in high-density developments, challenging technocratic paradigms with community-centred co-creation.

16. Mr Hongwei CUI

PhD in Information Engineering

Department of Information Engineering

Faculty of Engineering

Intelligent Reconfigurable Optical Wireless Ether

Optical wireless communication (OWC) uses light for wireless data transmission, potentially providing faster and more secure communication than traditional radio-frequency-based techniques like Wi-Fi. However, light's high directionality and its limited penetration ability restrict the signal coverage. To address this limitation, we propose an artificial "optical wireless ether" (OWE) fabric. OWE acts as a reconfigurable electromagnetic (EM) wave-propagating medium, intelligently enhancing the strength of light signals and redirecting their propagation to cover a broader area. Our proposed ether fabric comprises simple optical signal amplification units, called ether amplifiers (EAs), strategically placed in the environment, e.g., on ceilings. The EAs amplify and propagate signals at the analog level and are agnostic to the signal format: Signals propagate wirelessly between the EAs, losing strength due to attenuation during transmission but regaining it as they pass through the EAs. The key challenge in OWE design lies in the fact that, while increasing EA gains can extend signal coverage, it can also create positive feedback loops, resulting in self-interference and amplifier saturation, which distort the signals -- the key challenge in OWE design. This paper presents a systematic theoretical analysis to prevent amplifier saturation while optimizing the performance of OWE in both single-basic-service-set (single-BSS) and multiple-BSS scenarios. Optimization objectives could include signal-to-noise ratio, resource allocation fairness, and mutual interference. Furthermore, we conducted simulations and experiments to corroborate our theories. To our knowledge, ours is the first experimental demonstration of the feasibility of an artificial ether fabric for extending and guiding light propagation, laying a solid groundwork for future development and exploration of OWE.

17. Mr Zitong WANG

PhD in Education

Department of Educational Administration & Policy

Faculty of Education

School Feeding Program and Household Education Expenditure in Rural China

This study investigates how China's Rural Students Nutrition Improvement Program (RSNIP) reshapes households' allocation of resources between children's health and education by analyzing data from the China Family Panel Studies (CFPS). Results indicate that eligible households reduce food expenditures while increasing education-related spending, reflecting a reallocation of resources in response to the program. Further analysis reveals that this reallocation is more pronounced in households with lower incomes, lower parental education levels, and left-behind children. Additionally, we find that the RSNIP improves children's nutritional status, health outcomes, academic performance, and parental educational expectations. To explain these empirical findings, we develop a two-period household human capital investment model, which demonstrates how school feeding programs alleviate credit constraints for low-income households and encourage greater investment in children's education. This paper underscores the role of public feeding programs in influencing household spending decisions, promoting educational investment, and reducing the risk of intergenerational poverty.

18. Mr Aike SHI

PhD in Psychology

Department of Psychology

Faculty of Social Science

Remembering to Forget: Turning Memory Blunders into Learning Wonders

Mistakes are often viewed as signs of failure—but what if they are actually essential for learning? Our research explores how making errors during memory retrieval can lead to stronger, more durable learning than simply reviewing correct information.

Across two experiments, we examined how different types of error signals influence learning. In the first study, participants studied colorful images. For half of the images, they attempted to recall the color from memory, often producing inaccurate responses; for the other half, they restudied the correct colors. At the final test, memory performance was better for items that had been tested, despite the initial errors. Moreover, larger retrieval errors during practice were associated with greater improvements in memory, suggesting that the magnitude of discrepancy helps drive learning.

In a follow-up study, we examined how people's beliefs about their performance shape learning. After making a response, participants rated how large they expected their error to be and—after receiving feedback—how wrong they believed they had been. We found that objective error, predicted error (how wrong participants expected to be), and perceived error (how wrong they felt they had been after feedback) each contributed independently to memory gains. These results highlight the role of metacognition in learning.

These findings are further supported by our neuroimaging studies and computational models. Brain scans show that detecting an error engages regions involved in memory processing, suggesting that the brain treats mistakes as important learning events. A computational model of memory confirmed that learning improves when the system uses error-related signals to adjust future recall.

Together, the results challenge the assumption that correctness is the best learning path. Instead, effortful recall—especially when accompanied by self-monitoring—appears to engage deeper memory processes. Far from being setbacks, mistakes may be some of our brain's most effective learning tools.

19. Ms Ka Yee WONG

PhD in Education

Department of Educational Psychology

Faculty of Education

Evaluating the Segmentation Principle in Multimedia Learning: A Study of College-Level Statistics Courses

A good education system includes effective teaching methods and the delivery of learning materials. The traditional method of teaching with a chalkboard is becoming less motivating for students, as technology proves more engaging. However, it is critical to integrate technology appropriately to maximize teaching and learning outcomes. This can be achieved through multimedia, which incorporates both text and sound. Specifically, the application of segmentation—one of the multimedia principles—plays a significant role in learning.

Previously, there has been extensive empirical research on this topic of segmentation across various academic disciplines, such as geography and biology; however, little research has been conducted in the field of mathematics and statistics. Additionally, prior studies often involved experiments in controlled settings, such as laboratory rooms, during a single session which lasts for a few hours. To address this gap, the current study examines the effects of segmentation in college level statistics over a semester (a four-month period).

This study aims to explore the impact of segmented videos on learning performance and behavior within the framework of the Cognitive Theory of Multimedia Learning. The research was conducted at a community college with first-year students enrolled in a statistics course. A total of 100 participants (n=100) were divided into two groups: a control group (n=50) and a treatment group (n=50). The control group learned concepts through continuous videos, while the treatment group engaged with the same material using segmented videos. Learning performance and behavior were assessed for both groups.

Results indicated that participants in the treatment group demonstrated better learning performance and more positive learning behaviors throughout the semester. This study contributes to the understanding of segmentation principles by highlighting their long-term effects on students' academic performance and engagement.

20. Mr Long BAI

PhD in Electronic Engineering

Department of Electronic Engineering

Faculty of Engineering

Towards Intelligent Perception and Understanding of Multimodal Medical Intervention System

With the rapid development of artificial intelligence (AI) technology, Computer-Assisted Intervention (CAI) has played a significant role in advancing surgical automation and supporting clinical decision-making. It has greatly enhanced the efficiency of medical procedures, reduced patient harm, and facilitated recovery. This dissertation discusses and addresses several challenges in building intelligent CAI systems, including (i) low-quality visual data in medical scenarios, which can render lesions or target areas invisible, hindering diagnosis and treatment; (ii) precise understanding of vision-language data during surgeon-system interactions, which requires developing multimodal models capable of cross-modal alignment and collaborative analysis to integrate and interpret dynamic surgical environments in real-time, improving decision-making, safety, and efficiency; (iii) accurate 3D spatial understanding in surgical scenarios, as anatomical structures and instrument operations inherently occur in complex 3D environments. Models must accurately perceive spatial relationships among organs, tissues, and instruments to avoid errors. To address these challenges, this dissertation systematically constructs solutions across the pre-operative and intra-operative phases of CAI systems. Specifically, for the pre-operative phase, we introduce solutions for real-time low-quality restoration in endoscopic imaging. During the intra-operative phase, we focus on multimodal surgical scene understanding, interaction, and 3D reconstruction in vivo. Extensive experiments demonstrate the superior performance and robustness of the proposed solutions in CAI-related scene understanding and intelligent assistance. These findings highlight the potential of our approaches for clinical applications, providing strong support for the future development of AI-assisted CAI systems.