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CLIMATE CHANGE

THE OTHER LOOMING THREAT

TRACKING THE SPREAD OF COVID-19

Understanding the pandemic from
engineering, data and medical perspectives

DIGITAL DIVIDE IN HONG KONG

COVID-19 prompts major advances in
digital competence



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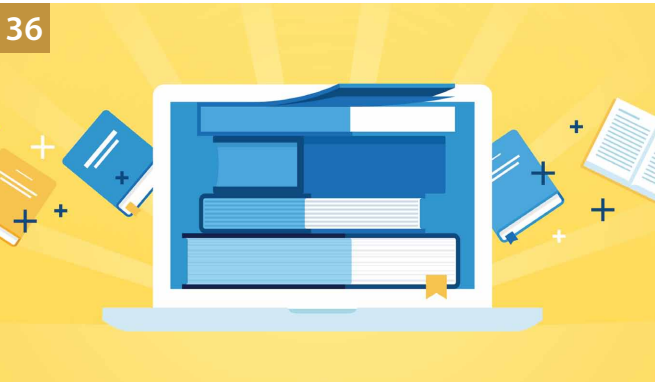
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CLIMATE CHANGE: THE WORLD'S OTHER CRISIS

Although COVID-19 has understandably captured the world's full attention this year, the dangers of climate change have not gone away. HKU scholars are applying scientific and legal expertise to assess the ecological and political dimensions of the problem, and the possible solutions. HKU also recently joined the International Universities Climate Alliance, a platform for researchers to exchange information on climate change and join forces in formulating solutions.



CARBON SINKS LOSING GROUND

Tropical forests and mangroves play an important role in absorbing greenhouse gas emissions, but rising temperatures are putting them at high risk of dying off.

Intact tropical forests that are untouched by human activity absorbed 17 per cent of human-made carbon dioxide emissions in the 1990s, or about 46 billion tonnes. But two decades later that has fallen to six per cent, or 25 billion tonnes.

The compromised capacity of these forests to literally take some of the heat from rising emissions was the subject of a major international study published on the cover of *Nature* this year that tracked more than 300,000 trees in the Amazon and Africa over 30 years.



Measuring trees in Lope National Park, Gabon. (Courtesy of Simon Lewis, University of Leeds)

The scientists, including earth-system modeller Dr Alexander Koch, a Post-doctoral Fellow in HKU's Department of Earth Sciences, provided hard evidence that these forests are at the brink of a path of diminishing returns.

"The tropics are currently a carbon sink because growing trees absorb more carbon than they emit when they die off and decay. But future warming will increase mortality. More trees will die, or they will grow faster and die faster," he said.

The threat to the trees comes from higher temperatures, faster temperature increases and more frequent droughts. While these factors have been known to be affecting forests for some time, they had not been quantified to the same extent as the current study.

Scientists from 94 institutions were involved in taking measurements of trees at 565 forest patches every few years over three decades, including diameter and estimated height. They also calculated the carbon stored in both the trees that survived and those that died, to track carbon storage over time.

Trees dying off

This information was fed into a statistical model that incorporated past and projected emissions of carbon dioxide, temperature and rainfall up to 2040. The data showed the forests' overall carbon uptake peaked in the 1990s and that the Amazon sink began to weaken first, starting in the mid-1990s. Africa followed about 15 years later.

Dr Koch and colleagues have also provided an answer as to when forests will reach a tipping point, in another recent study published in *Science* that focussed on temperature in tropical forests.

They found when the monthly mean rose above 32.2 degrees Celsius, there was a substantial drop in a forest's carbon uptake. "Above this temperature, especially under dry conditions, tree mortality exceeds tree growth and reduces biomass," he said.

The forests in their study had monthly means ranging from 28 to 34 degrees Celsius, with many approaching 31 degrees. "If temperatures increase by two degrees [in the coming decades], we would lose a substantial amount of tropical forest and potential carbon uptake," he said.

Yet two degrees may be a best-case scenario. Under the 2015 Paris Agreement on reducing greenhouse gas emissions, parties pledged to keep temperature increases 'well below' two degrees by 2100 and to aim for 1.5 degrees, but this will require substantial investment in emission reduction. Some projections suggest the world could heat up by more than four degrees Celsius this century if nothing is done to curb emissions.

Sea-level rises threaten mangroves

Tropical forests are not the only carbon sinks threatened by global warming. A study published in *Science* by another international

Mangroves are amongst the most valuable of natural ecosystems, supporting coastal fisheries and biodiversity.

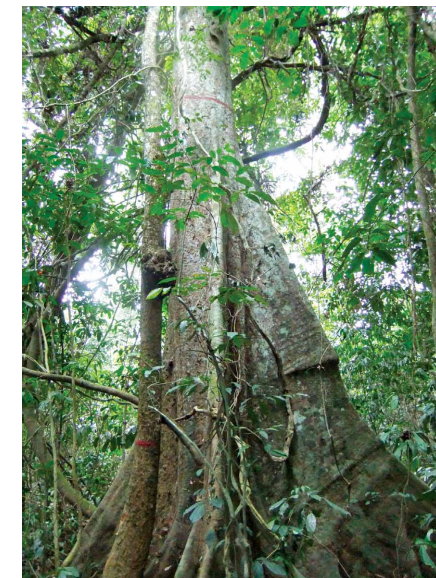
group of scientists, including Dr Nicole Khan, Assistant Professor of Earth Sciences, found faster rates of sea-level rise associated with higher temperatures also threaten mangroves. Mangroves soak up greenhouse gas emissions at greater densities than other forests, provide protection from storm surges and accommodate nursing grounds for young fish.

The researchers used sedimentary archives to examine how mangroves responded to sea-level fluctuations over the past 10,000 years and to estimate the probability of mangrove survival under rates of sea-level rise projected for low and high emissions scenarios. They found mangroves would be unlikely to keep pace with rates projected for 2050 if emissions remain high.

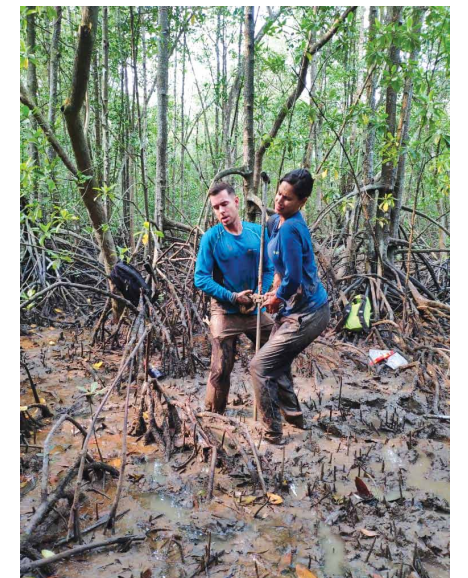
A factor in this is that much of their hinterland has been developed. Mangroves typically keep pace with sea-level rises by building up their substrate vertically. When sea levels rise faster than their ability to build vertically, they encroach inland.

"If we continue on a high-emissions trajectory, mangroves will face a high risk of loss. We need to adopt coastal management and adaptation measures to give them room to grow," Dr Khan said. (A separate HKU study has demonstrated that such mitigation measures can help – see page 14.)

Dr Khan was also involved in another study that showed global mean sea levels could rise by more than one metre by 2100 if emissions



A large tree in Esuboni Forest Reserve, Ghana. (Courtesy of Sophie Fauset, University of Plymouth)



Dr Nicole Khan (right) and her colleague investigating the growth of mangroves.

are not reduced. By comparison, the level has risen by 0.2 metres since the late 19th century.

"Hong Kong and the Greater Bay Area have a large population and extensive infrastructure located in vulnerable, low-lying areas. These will be increasingly exposed to the impacts of sea-level rise and coastal flooding if emissions targets are not met," she said.



DR ALEXANDER KOCH

amount of tropical forest and potential carbon uptake.

MYSTERIES OF THE DEEP

Abrupt sea-level events caused by ice sheets melting are crucial to our understanding of Earth's climate system and how it is influenced by glacial conditions. A new discovery that eustatic sea-level rises can be discontinuous and sudden, has big implications, especially for low-elevation cities like Hong Kong.

A great mystery in palaeoclimatology is the timing and magnitude of the second largest meltwater pulse (MWP-1B). A meltwater pulse is an abrupt rise in sea levels caused by a sudden influx of meltwater. The first MWP, known as 1A, is well documented but until now the exact timing and magnitude of MWP-1B have remained under debate.

As often happens at such moments, the MWP-1B was not actually the subject under study when Ms Skye Tian Yunshu (who was doing a Major in Ecology and Biodiversity at the time, and is now a PhD student) made the discovery. She was focussing on reconstructing past oceanographic change (palaeoceanography) of temperature and salinity using small fossils called Ostracoda as a proxy.

Skye led the study under the supervision of Dr Moriaki Yasuhara and Dr Yuanyuan Hong, both from the School of Biological Sciences and Swire Institute of Marine Science, and in collaboration with Professor Tine Rasmussen

of UiT The Arctic University of Norway, who is a top specialist of Arctic palaeoceanography.

Faunal shift

Dr Yasuhara said: "We were not expecting to see a sea-level change recording a meltwater pulse from the data. But during the study, Skye discovered a strong faunal shift and we gradually realised it must reflect the meltwater pulse."

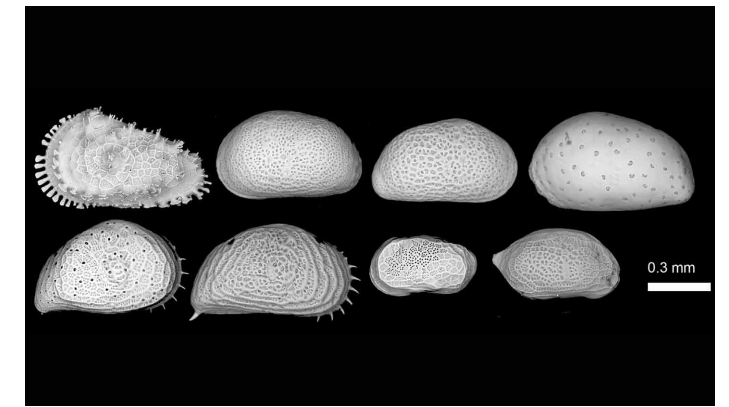
Skye said: "Based on other studies of the last deglacial-Holocene history of the Svalbard region, we initially hypothesised the salinity changes may have contributed to ostracod faunal turnovers in our two cores. Only after we had the ostracod census data and investigated the ecology of every species in the references, did we realise the ostracod faunal turnover at 11,300 years BP [Before Present] reflected the abrupt sea-level changes of the MWP-1B because of the melting of large ice sheets.

"The MWP-1B was first discovered from coral cores in low-latitude regions [known as far-field – that is, places far enough from the polar ice sheets, like low latitude areas such as Hong Kong]. But the MWP-1B as an abrupt sea-level event remains controversial because its timing, rate, and magnitude are not well constrained under the background of continuous deglacial sea-level changes. Unlike elusive far-field records, our study indicates abrupt sea-level changes of 40 to 80 metres in approximately 300 years in Svalbard, a high-latitude region near the polar ice sheets and source of meltwater [known as near-field, where ice sheet melt causes large sea-level change]. We think it's clear evidence of MWP-1B."

The research group used fossil Ostracoda preserved in two marine sediment cores as an indicator to quantitatively reconstruct the water depth changes in Svalbard in the past 13,000 years. More than 5,000 specimens and 50 species were recorded in two sediment cores from Storfjorden in Svalbard.



Dr Yasuhara (right) and Professor Tine Rasmussen of UiT The Arctic University of Norway (left).



Scanning Electron Microscopy image of typical shallow-marine (neritic) ostracod species from the study sites.

"Ostracods are a group of small (usually <1mm) aquatic crustaceans which are very sensitive to water conditions," said Dr Yasuhara. "They have calcareous shells that are very well preserved as fossils and their fossil shells have a variety of morphological characters that allow precise species identification of specimens. In addition, they are abundant in a small amount of sediment and so it's reasonably possible to obtain enough numbers of specimens needed for robust statistical analyses, even from a small amount of sediment typically available from sediment cores that are usually <10cm in diameter. There are very few such organisms and fossils ostracods are an ideal proxy to reconstruct palaeoenvironmental changes."

Much of the hard work was down to the efforts of Skye, who embarked on this research as her Final Year Project with Dr Yasuhara. Dr Yasuhara said: "Skye did an outstanding job and proved that an undergraduate student can do first-class scientific discovery important for the global research community and publish the result in a very top journal like *Quaternary Science Reviews*."

Global sea-level rise

While their studies focussed on a period more than 10,000 years ago, the implications of the discovery in connection with today's rising sea levels are important. Dr Yasuhara said: "Our study showed that sea-level change and warming are not linear in relationship. Future warming may not mean a gradual global sea-level rise, but may result in some sudden sea-level jumps at unpredictable times, which has

huge implications for our society, especially cities on coastal plains of low elevation, like Hong Kong."

The Yasuhara Lab broadly works on past ecosystems, biodiversity, environments, and their interactions mainly via ostracod micropalaeontology. "We continue our research in the Svalbard region with Tine," said Dr Yasuhara. "We are studying methane seep activity and ecosystem changes using sediment cores in the region.

"Closer to home, we are also working on reconstructing Holocene sea-level change and historical anthropogenic impacts [for example, pollution and eutrophication] on marine ecosystems in Hong Kong using sediment cores and other samples. The result will give a nice far field sea-level record and a robust reconstruction of the history of human-induced marine ecosystem degradation."



DR MORIAKI YASUHARA

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FEELING THE HEAT

An international team of marine biologists have been looking at another aspect of temperature change in oceans – the impact of the 2016 heatwave on the Great Barrier Reef in Australia and how it affected five species of reef fishes. The marine heatwave (MHW) was the longest and hottest thermal anomaly on record and killed a third of the reef's corals. The team, led by Dr Celia Schunter, Assistant Professor in the School of Biological Sciences and Swire Institute of Marine Science, measured RNA in fish livers and discovered many genes changed expression levels across different time points of the MHW, revealing important functions such as cellular stress response and changes in metabolic function. Given similar heatwaves in recent years in the South China Sea, Dr Schunter is calling for more research to be done on the marine waters of Hong Kong.



With elevated temperatures during a marine heatwave this cardinalfish species (*Cheilodipterus quinquelineatus*) shows the least changes in gene expression and appears to be more tolerant.

THE SOVEREIGN STATE FEELS THE HEAT

However you look at it, the modern state is ill-equipped to deal with the challenges of climate change.



Melting ice has transformed sections of the Northwest Passage from land into sea – is it still part of the Canadian landmass? Could it be considered open ocean?

Dr Daniel Matthews of the Faculty of Law is an admirer of English philosopher Thomas Hobbes, who defined sovereignty as it is commonly understood: escaping nature under the security and protection of the state through a social contract. Hobbes was writing 400 years ago and today, the cracks are showing.

“Hobbes was extraordinarily creative in rethinking how we define political authority,” Dr Matthews said. “But even though sovereignty is back big time, with Brexit and the rise of populism being examples, I see that as a real dead end for dealing with the challenges of climate change.

“Climate change does not respect state borders and many of its effects are non-anthropocentric, impacting on a range of non-human forces and relations described by geology and ecology. Modern politics is really bad at being sensitive to these forces.”

Dr Matthews has been tracking these shortfalls as a scholar of the history and theory of sovereignty and sees problems in all three components that define sovereignty: territorial, populational and institutional.

In terms of territory, climate change is altering the geophysical environment, including boundaries, which had largely been considered immobile and fixed. In Canada, for example, melting ice has transformed sections of the Northwest Passage from land into sea, raising questions over whether it is still part of the Canadian landmass or could now be considered open ocean. “These kinds of challenges are only going to become more significant in the coming years,” Dr Matthews said.

Non-human actors ignored

The focus on humans as the only population considered worthy of political attention in sovereign states also raises concerns. “It’s becoming clear that the security of a nation depends on all sorts of non-human animals which are constitutively ignored in the classic definition of sovereignty, such as the biodiversity of insects for the pollination of

crops, animals that are farmed for protein and so forth,” he said.

Institutionally, instruments such as parliaments and courts have been designed to consider human rights and interests, not those of nature. Some places have experimented with addressing this issue – in Ecuador, for instance, the constitution recognises the Rights of Nature and in New Zealand the Whanganui River has recently been granted legal personality. Other institutional experiments include cities linking up through global networks to develop and implement climate policies. But it is still far from adequate.

“Sadly, we are only at the beginning of this process. We need a radical re-thinking of some of the things we take for granted,” he said. “The novelist Amitav Ghosh has said that climate change is more a crisis of the imagination than a crisis of policymaking. We need new ways to imagine the meaning and scope of the political.”

Maps and other limitations

Dr Matthews is contributing to that discussion with a forthcoming book, *The Aesthetics of Sovereignty in the Anthropocene*, that looks at how maps, rituals, symbols, fictions, narratives and other aesthetic elements are mobilised to legitimise a state and how these practices interfere with our ability to address the unprecedented and disturbing planetary changes wrought by human activity over the past 200 years.

“The aesthetic dimension of sovereignty constructs how sovereignty and our political identities appear in the world and allow us to imagine the world in a particular way; but they also have limitations,” he said.

“Maps, for example, are wonderful devices for doing all sorts of things, particularly in representing the scope of territorial authority, but they only depict empty, homogenous space. They are not sensitive to all sorts of forces that are increasingly relevant in the current moment, such as biodiversity, risks associated with rising sea levels, or the nature



The Whanganui River in New Zealand has been granted legal personality, meaning it has been awarded the same legal rights as a living entity.

and composition of the soil. Maps, and the cartographic imaginary they engender, inure us to the changing geophysical environment and the non-human actors we depend on for our survival. And they limit our ability to think creatively about these challenges.”

Radical changes needed

Getting people to see the world differently, both in the visual and contemplative sense, will not be easy. The COVID-19 pandemic offers a glimpse of the challenges. “We’ve seen a reassertion of national borders, concentration of power in the hands of the executive, greater emphasis on who gets the privilege of citizenship and who doesn’t. I fear we will see repeats of this in future climatic crises,” he said.

Dr Matthews hearkens back to Hobbes, who was also exploring how politics could be re-organised in a changing world. “This idea that we have to deny our attachments to the natural world in order to create a distinct political sphere is precisely what needs to be reversed. But the way things are going at the moment doesn’t make me massively hopeful,” he said.

“Radical changes need to take place. It can’t be business as usual. Exactly how these

changes will be instituted, no one knows. In my own work, I’m hoping to point out the limitations of the existing coordinates that define modern sovereignty and encourage critical and creative thinking about the changing nature of political authority in the context of climatic transformation.”

The Aesthetics of Sovereignty in the Anthropocene will be published by Edinburgh University Press in 2021.



DR DANIEL MATTHEWS

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POWER PLAYS

Renewable energy should be a solution for reducing our impact on the climate. But politics and market considerations are complicating its development and spread.

For all the publicity and enthusiasm generated around renewable energies such as solar, wind and biomass, their actual adoption has not been so remarkable. Although their usage in electricity generation has increased from 0.6 per cent of the global total in 1973 to eight per cent in 2016, they are still a small portion of all energy sources. Moreover, in terms of quantities, we use twice as much fossil fuel today to generate energy as we did in the 1970s, even when renewables are accounted for.

While there are technical stumbling blocks to renewables, such as the need for better batteries to store solar energy, there are also political blocks. Dr Kim Jung Eun of the Department of Politics and Public Administration has spent the past decade investigating the problem of how to effectively transfer renewable energy technology from the developed countries where it is created, to developing countries.

“Developed countries have the capacity to innovate and implement new technologies and policies, but developing countries are still more focussed on economic development. Even if they have the capacity to implement a policy, there is not much motivation to do it or to implement it fully,” she said.

Good policy designs are important because otherwise it is difficult to persuade private businesses anywhere to change their behaviour or adopt new technology. The most innovative policies tend to come from developed countries, such as the Renewable Portfolio Standard (RPS) in the United States, a regulatory policy that sets quantitative targets for renewables and lets utilities trade credits, and the Feed-in Tariff (FiT), an incentive scheme used in places like Germany that lets people sell energy generated through renewable means to the electricity grid.

Regulation better than incentives

To date, FiT has made more inroads in developing countries, but Dr Kim’s research suggests this might not be the most effective approach.

“My research has found that in developing countries, regulation works better than incentives in promoting renewable energy use,” she said.

Developing countries also need support beyond simply adopting a technology or policy from abroad. Dr Kim looked at transfers of non-hydro renewable energy technology to developing countries and found the transfer alone did not really increase recipients’ capacity.

“You need a maintenance programme to go with it. In the past, this kind of knowledge exchange tended to happen without consideration of the local context, although this is changing. My hypothesis is that that approach can affect recipient countries’ motivation, which in turn can affect the success of these transfers,” she said.

Consideration also needs to be given to the kinds of renewable energies that are being used. Dr Kim has recently been looking at how policy design affects the technology adopted, initially focussing on developed countries where the policies originate (she plans to extend this to developing countries later).

“There are two kinds of policies regarding technology diffusion. One is tech-neutral, the other is tech-specific. If the policy specifies the technology to be used, then that technology will grow its share in the market. But if the technology is not specified, then the market will choose the most cost-effective option,” she said.

Market gets locked in

Wind is usually the cheaper option and the one utilities tend to opt for when faced with a policy that requires them to derive a certain percentage of energy from unspecified renewables. However, this approach may stunt the development of other technologies, such as solar and biomass. On the other hand, if a policy stipulates that, say, two per cent of renewable energy must be solar energy, it leaves the door open for future expansion of this technology.

“Once a technology is dominant in the market, a political economy develops around it. The market gets locked in. But solar and other technologies that are now less cost-effective might become more efficient with future innovation, so you want to keep those technologies for now that may have future potential,” she said.

Dr Kim cautions against raising hopes too high over renewable energy because of other limits to its growth. Renewable energy tends to be more intermittent than coal, gas, hydro or nuclear power. Moreover, wind farms require large areas of land and tend to be located far from population sources, and solar relies on batteries to store electricity for use at night. These batteries contain materials with ethical issues, such as cobalt which is toxic and mined in places like the Democratic Republic of the Congo where child labour may be used.

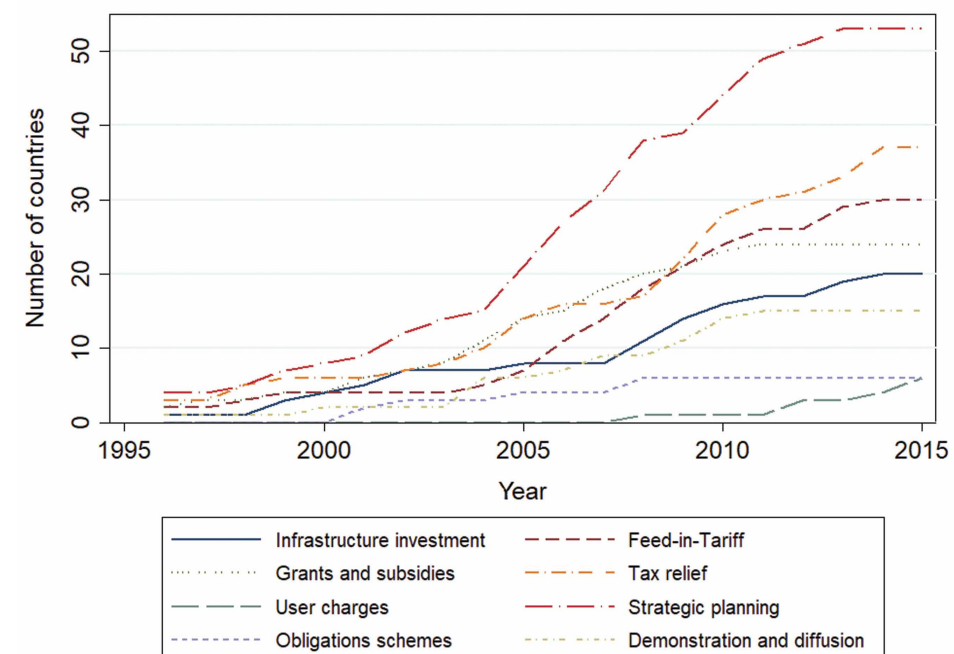
“There is a great deal of effort going into renewable energy and a lot of motivations. It’s all a bit messy. Its use will definitely grow, but I don’t see there being a complete transition to renewables in the short term,” she said.



DR KIM JUNG EUN

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Number of countries with different renewable energy policy instruments



AIRBORNE SOLUTION

Research by Dr Nam Kyung-Min shows air pollution and climate change policies work best if they go hand in hand.

Governments need an incentive to take the hard decisions necessary to address climate change, but many, particularly in the developing world, tend to put off taking decisive action because the costs of climate mitigation may exceed the payoffs and take decades to be realised. Dr Nam Kyung-Min of the Department of Urban Planning and Design has produced solid evidence that an incentive can be found in the here and now.

Dr Nam's focus is the link between climate change and air pollution, particularly in China which is the world's largest carbon emitter and suffers from serious air pollution.

China's air pollution is notorious for its magnitude – in 2015, for example, the annual mean concentrations of particulate matter, which can penetrate deep into human respiratory and circulatory systems, exceeded the World Health Organization guideline levels by eight times in Beijing. In response, China has been taking increasingly stringent actions against air pollution. As a result, not only has air pollution abated but so have greenhouse gases, whether China intended so or not.

"Air pollutants and greenhouse gases are different and they are often controlled independently of each other in many countries," Dr Nam said. "But these two gas species are inseparable in both being to a large extent co-generated from fossil fuel combustion. Accordingly, if you abate air pollutant emissions, fossil energy use is constrained, as are greenhouse gas emissions, and *vice versa*. This linkage is particularly strong in China given its high dependence on coal for domestic energy supply."

This observation is important because around the world, governments have been exhorted to reduce greenhouse gas emissions to save the planet – a goal that is more vague than asking them to reduce air pollution to protect health, which most countries, including China, are keen to do.

The global benefit of local action

"The Chinese government has become serious about pollution abatement and imposed absolute emissions reduction targets. In contrast, its carbon mitigation goal is relatively moderate and is expressed in terms of 'intensity', which is carbon emissions per unit of gross domestic product. China wants to reduce carbon intensity by up to 65 per cent by 2030, using 2005 as the base, but because the economy keeps growing at high rates, absolute carbon emissions in 2030 may still be substantially above the 2005 level," he said.

Yet Dr Nam's research has shown that China may still achieve much greater carbon reductions than its official targets because of its stringent air-quality control.

Using an energy-economic simulation model, he looked at data for both pollution and carbon emissions and found that reducing pollutants such as nitrogen oxides and sulphur dioxide helps reduce absolute carbon emissions, too. This was one of the first studies to explore the potential climate co-benefits of air pollution abatement in China.

"Mainstream co-benefit analysis tends to place carbon mitigation policy, rather than air pollution abatement, at the centre. Developing

countries like China and India have been urged to join the global effort to mitigate carbon emissions by arguing that this is much less costly if the ancillary air-quality improvement is taken into consideration, too.

"My approach champions the reverse logic. If you want developing countries to act in favour of global benefits, you need to incentivise them locally."

Dr Nam has also been looking at market-based instruments for climate mitigation such as an emissions trading scheme (ETS), particularly in Hong Kong's context.

Another solution: carbon trading

Hong Kong has imposed a similar carbon emissions reduction target as China but has less room to manoeuvre in achieving that goal. About two-thirds of Hong Kong's carbon emissions come from thermal power plants operated by two local firms, which are already required to install equipment to reduce emissions and switch from coal to less carbon-intensive natural gas. The transport sector, which accounts for much of the remaining local carbon emissions, faces similar requirements. Given the small number of potential participants and a tiny carbon market, Hong Kong would have difficulty sustaining an ETS on its own. But Dr Nam sees a solution across the border.

He believes Hong Kong could achieve its official mitigation goals at lower costs by participating in China's ETS, which is being trialled in eight Mainland locations. This lets firms in industrialised areas trade carbon

credits' with those in less urbanised areas or from more energy-efficient sectors within a given economy-wide emission cap.

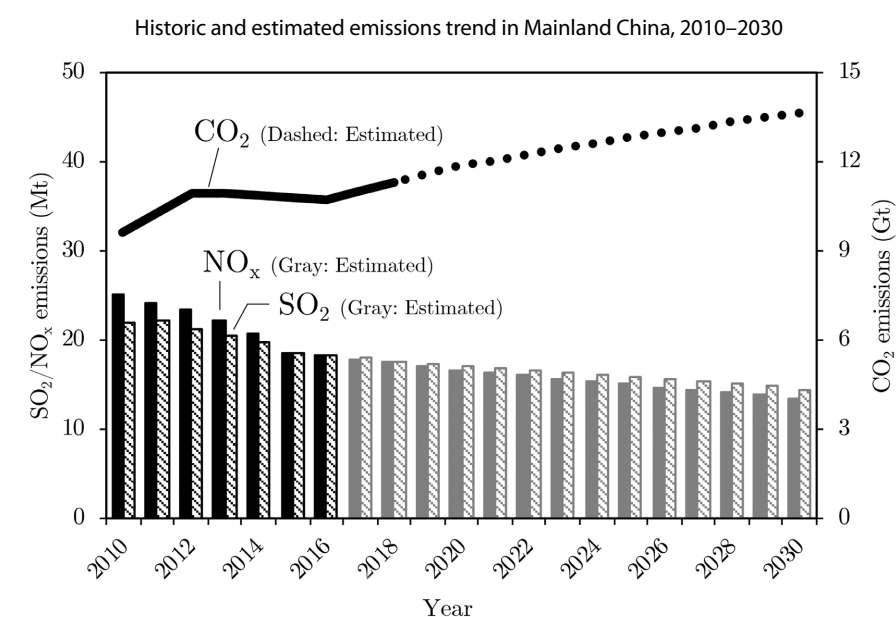
"If Hong Kong tries to achieve its carbon reduction goals solely through command-and-control regulations, it would be very costly. It is hard to imagine that Hong Kong could develop its own carbon market, but its participation in China's national ETS seems to be a feasible and realistic option," he said.

Dr Nam has developed a computer simulation model based on microeconomic theory and is starting to estimate the effects of cross-border emissions trading between Hong Kong and Mainland China. "I hypothesise that the policy compliance cost measured in terms of GDP loss will be much lower than if Hong Kong regulated its market separately," he said. He hopes the results, due next year, will help increase local policymakers' attention on regional emissions trading.

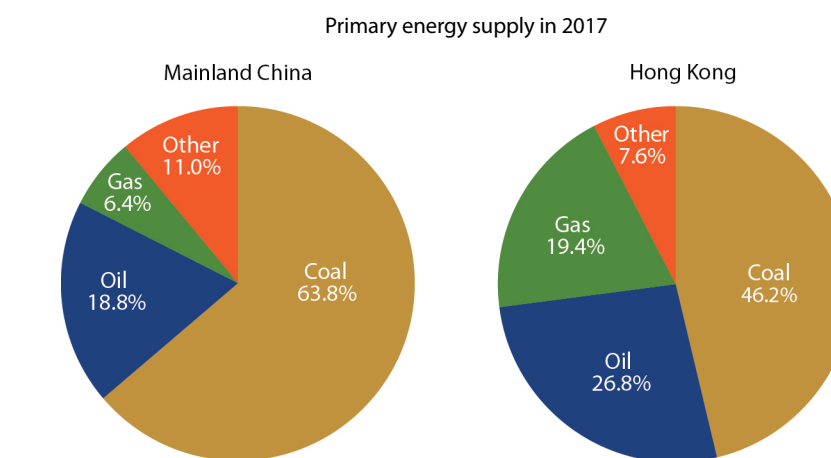


DR NAM KYUNG-MIN

"If you want developing countries to act in favour of global benefits, you need to incentivise them locally."



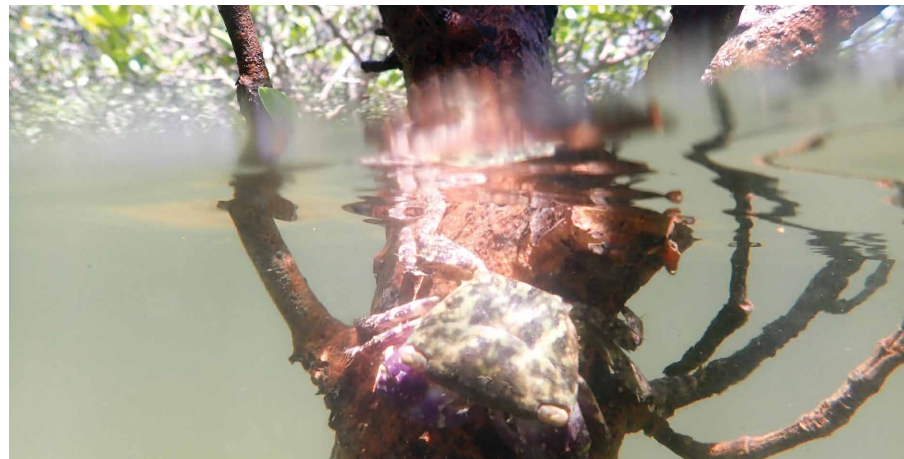
Note: China's 13th Five Year Plan targets for NO_x and SO₂ reductions are further extended till 2030; Estimated CO₂ emissions assume that China's Paris Agreement mitigation targets are met.



(Source: Created by the author from the International Energy Agency database)

REASONS TO FEEL LESS HELPLESS

HKU researchers have identified areas where local actions may alleviate some of the impact on marine life and shorelines that is typically associated with global climate change.



A crab resting on a mangrove in Ting Kok, Tai Po, Hong Kong.

Corals and mangroves are like canaries in the climate change coalmine. Research has shown that these ecosystems are already experiencing harm that may get much worse. But recent work by scholars in HKU's Swire Institute of Marine Science (SWIMS) and their collaborators has found the situation is a little less hopeless than feared.

The coral study showed that water quality may be a more important stressor for coral communities in the Pearl River Delta (PRD) than global warming, while the mangroves study showed it was possible to rehabilitate these ecosystems.

Dr David Baker of SWIMS and the School of Biological Sciences was part of a team of scientists from HKU, Princeton University and the Max Planck Institute for Chemistry that conducted the coral study.

"We found that in the Pearl River Delta, the threat to corals originates from our inadequate treatment of wastewater. This is interesting because global warming is usually singled out as the cause of coral decline worldwide. We often feel helpless in that scenario because a solution would require everybody on the planet to drastically change their lifestyles. But wastewater treatment is something we can fix more easily," he said.



Researchers drilling coral under water.

The study assessed the growth of living coral in the Pearl River Delta over the past two centuries. Corals form bands that are similar to tree bands – during cooler weather they are smaller due to a decrease in calcification and in warmer weather they are larger. This growth is fuelled by resources drawn from seawater, particularly nitrogen which is a key component of protein scaffolding.

Nitrogen is prevalent in human sewage and during the period under study, the Pearl River Delta's population increased from a few thousand to more than 100 million people. Water quality declined in the latter part of the 20th century and the study was able to link that to coral growth through X-rays of the corals and material extracted from their bands. It also showed that Hong Kong's improved wastewater treatment from the year 2000 had had a positive impact on corals.

"Paradoxically, our study is good news because it implies that the solution to coral decline is in our hands. The improvements in Hong Kong indicate that these efforts must be continued if we want corals to come back here," Dr Baker said.

A team of international mangrove forest experts now find cause for optimism for global mangrove conservation.

Turning of the tide

Another area of cautious hope is mangroves. Experts warned more than a decade ago that they were being lost faster than almost any other ecosystem, including coral reefs and tropical rainforests. Dr Stefano Cannicci of SWIMS and the School of Biological Sciences was among the team that sounded the alarm. Now he is singing a different tune.

The rate of mangrove loss has improved dramatically, from about 1–3 per cent per year in the late 1990s to 0.3–0.6 per cent more recently. This is attributed to successful conservation efforts, such as better monitoring, changing industrial practices, rehabilitation, and expanded management and protection, and was reported in a study with researchers from 24 institutes around the world, including Dr Cannicci.

"I am very proud to have been among the academics warning about mangrove loss more than a decade ago because I think it helped turn the tide on mangrove degradation. The perception about their importance to humankind and the planet has changed, although there are still dangers. We need to keep up the effort to manage and preserve mangroves worldwide," he said.

Areas of concern include the uneven distribution in mangrove conservation gains across the world and the risk of mangroves being sandwiched between rising sea levels and developed hinterlands that constrict their growth (see also page 4).

Nevertheless, places like Hong Kong have seen improvements. Dr Cannicci recently recorded about 40 mangrove forests here covering about 350 hectares, which is the largest mangrove patch within the PRD. "Although small and limited in size, Hong Kong mangroves contain a magnificent diversity of plant and animal species: eight species of trees, 53 species of crabs and 42 species of snails. This is more than is known for the mangrove forests of the entire African continent," he said.



DR DAVID BAKER

“We found that in the Pearl River Delta, the threat to corals originates from our inadequate treatment of wastewater. This is interesting because global warming is usually singled out as the cause of coral decline worldwide.”

BETTER AIR, BETTER WATER

Reducing greenhouse gas emissions is not just good for the atmosphere and sea levels – it could also improve water quality.

A study by SWIMS and the Department of Earth Sciences of the South China, East China, Yellow and Bohai Seas found nitrogen oxides from air pollution affect water quality when they fall into the water because they enhance the production of algae. When the algae die and sink to the bottom, their decomposition decreases dissolved oxygen in the water, which is bad for marine life. However, their model shows that reducing the emission of anthropogenic nitrogen in the atmosphere could lead to an improvement of water quality, notably in the South China Sea.

"Our study shows the potential benefit of reducing fossil fuel burning not only on humans and the ecosystem, but also local activities such as fisheries," said PhD student Miss Yau Yu-yan, who led the research under the supervision of Dr Benoit Thibodeau.



Anthropogenic pollutants can be observed in the atmosphere of many Chinese coastal cities.

COVID-19: TRACKING THE PANDEMIC

Rigorous research is the key to understanding COVID-19 and getting its spread under control. Scholars in the Li Ka Shing Faculty of Medicine (HKUMed) are at the forefront of this research and have rightly received attention from around the world for their significant findings (see recent highlights on page 19). But scholars in other disciplines have also applied their expertise to reveal new characteristics about the pandemic. On these pages, engineering research shows how poor ventilation can increase risk of exposure to the virus, while business research shows how phone data can be used to track COVID-19's spread in the population.



POOR VENTILATION HELPS THE VIRUS SPREAD

HKU's Department of Mechanical Engineering has shown that COVID-19 can be transmitted several metres by air when there is poor ventilation – a timely warning as winter approaches and people spend more time indoors.

The finding came out of a detailed study of three COVID-19 outbreaks in crowded situations that looked at where infected individuals were located, who they infected and the rate of ventilation. The outbreaks were at a Guangzhou restaurant, two Hunan buses, and the Diamond Princess cruise ship from January to March, and the study was led by Professor Yuguo Li, Chair Professor of Building Environment, who previously played a key part in showing the role of ventilation in two clusters of cases during the 2003 SARS outbreak.

At the Guangzhou restaurant, three families who did not know each other were sitting at adjacent tables. An index patient sat at one table and subsequently infected nine people at all three tables, including one person who sat 4.6 metres away. Subsequent measurements by Professor Li and his team showed the ventilation rate was only 1 L/s (one litre per second) per person, against the international standard of 5 L/s.

Similarly, the Hunan buses were poorly ventilated. One index patient took a bus ride of three hours and 20 minutes that resulted in seven patients being infected, then took a second one-hour journey on a minibus in which two people were infected. The furthest infected person was 9.5 metres away from the index patient. The bus had a time-averaged ventilation rate of 1.7 L/s and the minibus 3.2 L/s.

Keep the air moving

On the Diamond Princess, which had more than 700 confirmed cases, the findings went the other way: the team showed that infection among passengers after the onset of quarantine was limited to those who had stayed in the same stateroom as an infected passenger. This probably meant the central air-conditioning system did not play a role, although the team were unable to get reference measurements.

"In a sufficiently ventilated room, droplet concentrations in the exhaled jet of air from an infected person will continually decrease and become indistinguishable from background room air at a distance of about 1.5 metres. Our findings suggest that airborne transmission of the COVID-19 virus

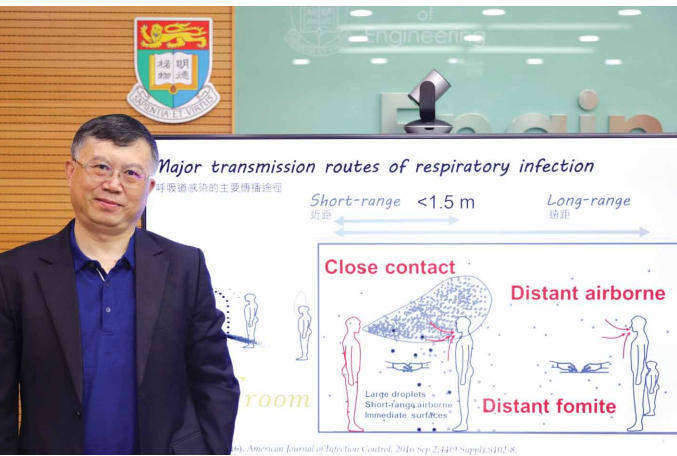
indoors is likely when the ventilation rate is less than 3 L/s per person," Professor Li said.

Public places should enhance indoor air ventilation and social gatherings indoors should be avoided if there is not sufficient ventilation, he said. A carbon dioxide sensor could help indicate poor ventilation if the reading is more than 1,000 parts per million. Otherwise, "a simple criterion for insufficient ventilation is if you can smell other people's breath from a distance," he added.

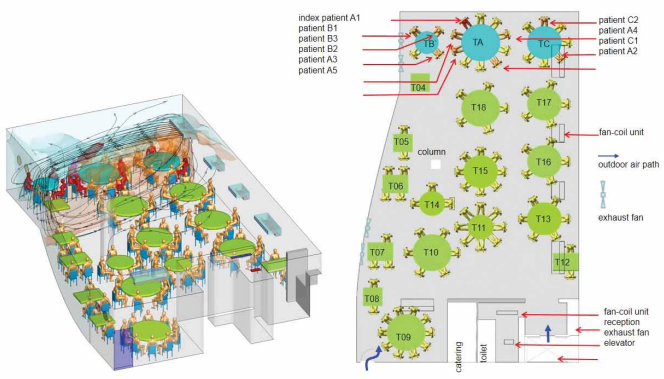


PROFESSOR
YUGUO LI

“A simple criterion for insufficient ventilation is if you can smell other people's breath from a distance.”



Professor Li is an expert in ventilation of indoor environments with a focus on environmental transmission of diseases.



The path of airflow between the tables of the three families involved in the Guangzhou restaurant case.

USING PHONE DATA TO TRACK A PANDEMIC

A team of business and statistics researchers, with little background in medicine, have developed a model to accurately predict COVID-19's spread and assess risk using only mobile phone data, and to explore people's response to the pandemic.

The team, led by Dr Jayson Jia Shi of the Faculty of Business and Economics, focussed on Wuhan, the epicentre of the COVID-19. Complex mathematical models had shown, in retrospect, how the virus spread to the rest of the country and the world. But Dr Jia and his colleagues found a simpler, real-time path to the same conclusion with mobile phone data.

Phones automatically alert cell towers whenever they are in range, making them useful for showing population movement. Dr Jia and his collaborators had access to anonymised mobile phone data from China's telecom companies and used it to track COVID-19's spread.

They showed that from January 1 this year to January 24, when Wuhan was quarantined, more than 11 million people travelled through the city on their way to 296 prefectures on the Mainland. This information was fed into a model that also captured the number of COVID-19 cases in each place. The results confirmed what

these places experienced: the traffic of people from Wuhan predicted how fast their case load grew. The findings were published in *Nature* at the end of April.

"Our model captured 96 per cent of the statistical variance in the growth of COVID-19," he said. "By establishing this relationship, we could also predict about two weeks into the future with good accuracy."

They received proof of this while still in the midst of the study, when they noticed that Wenzhou in Zhejiang province was reporting far fewer cases than predicted by the number of arrivals from Wuhan. A short time later, the reported cases started rising and Wenzhou imposed quarantine conditions.

"Our paper established the basic assumption that you can use movement data to infer that there are going to be more imported cases," he said. Their efforts resulted in a COVID-19 risk modelling toolkit and other scholars have picked up on the findings to explore the relationship further.

Coping behaviour

Dr Jia is now looking at another aspect of mobile phones, the use of apps, to explore

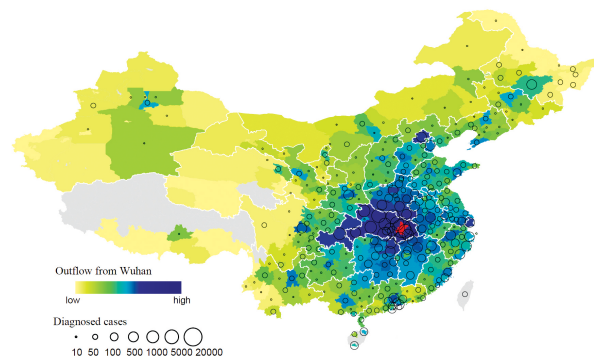
COVID-19's impact on people's behaviour. This follows on from earlier research he did on the 2013 Ya'an earthquake in Sichuan.

That study focussed on social networks and used data from family phone plans to see who people called right after the earthquake hit (mainly family members, rather than the people they called most frequently prior to the tremor, who are presumably work colleagues and friends). It then went a step further to look at which apps people used in the wake of the quake.

Apps were divided into three categories – information related (such as news and banking apps), communications (such as WeChat) and hedonic (such as games, video and music). The data showed that people who lived closest to where the tremor was strongest increased their use of hedonic apps in the following week. Moreover, the use of hedonic apps was associated with less fear about future earthquakes, as revealed in a survey carried out around the same time.

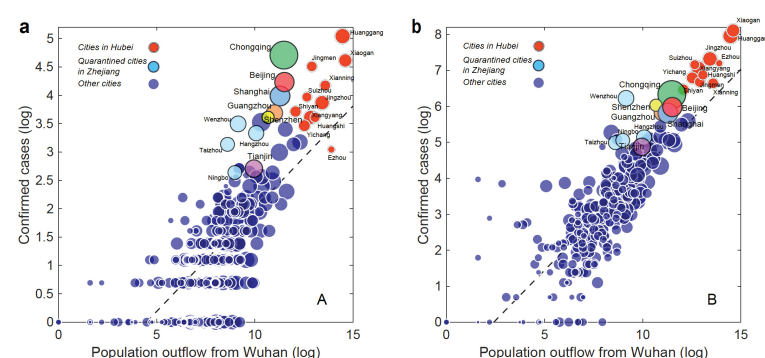
"That was really the surprising finding – the more they engaged in hedonic behaviours, the lower their perceived risk was. The use of these apps was an effective coping behaviour," Dr Jia said.

Geographical distribution of population outflow and confirmed COVID-19 cases as of February 19, 2020



There is a high overlap between the geographical distribution of aggregate population outflow from Wuhan until January 24, 2020 (in red) and the number of confirmed cases of COVID-19 in other Chinese prefectures ($n = 296$ prefectures). (Map source: National Catalogue Service for Geographic Information. Grey areas lack population outflow data.)

Correlation between population outflow from Wuhan and confirmed COVID-19 cases



The relationship between the log-transformed aggregate population outflow from Wuhan (up to January 24, 2020) and the log-transformed number of confirmed cases by prefecture on January 26, 2020 (a) and February 19, 2020 (b). Red circles are prefectures in Hubei; light blue circles are four quarantined prefectures in Zhejiang (including Wenzhou); and the six largest prefectures in China are indicated with unique colours.

"Mobile apps are a way of using digital behaviour to infer what's on people's minds, so now we're using the shock of the pandemic to study lifestyle changes."

Applying that approach to COVID-19, Dr Jia and his team have been analysing data from Chinese users and the longer-term consequences of less physical mobility and social mixing. Compared to before the pandemic, people have become more reliant on some apps, for example short form video and food delivery apps (no surprise there), and they have changed the way they look at other apps, for example dating apps which previously were correlated with information apps but are now more associated with entertainment apps.

There have also been some positive changes as people make greater use of learning and studying apps, job search apps, and exercise apps (and presumably exercise more). These findings are still in raw form and the implications will need further analysis.

Dr Jia is also trying to promote the idea of social networks when considering the risk factors of COVID-19. "Researchers used to study risk from an atomistic perspective, such as focussing on an individual's fears or what they thought they could do about a situation. But little thought has been given to social networks and how risk is sometimes beyond our personal control. Let's say you are really careful about going out, but a family member

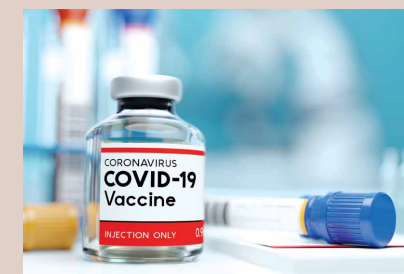
isn't. That person is exposing you to risk. So conceptually, we are trying to introduce the idea of networks to risk perception," he said.



DR JAYSON JIA SHI

“Mobile apps are a way of using digital behaviour to infer what's on people's minds, so now we're using the shock of the pandemic to study lifestyle changes.”

RECENT COVID-19 RESEARCH ADVANCES



HKUMed scholars have made world's-first discoveries on COVID-19 and are forging a path towards deeper understanding and control of the disease. Selected highlights in recent months* include:

- **Vaccine candidate approved for clinical trial:** A flu-based vaccine developed by the State Key Laboratory of Emerging Infectious Diseases in partnership with Xiamen University and Wantai Biopharmaceutical company, was approved for clinical trial in humans in September by China's National Medical Products Administration. This is the world's first nasal spray COVID-19 vaccine to be tested in humans.
- **First proof of reinfection of COVID-19 virus:** Scientists in the Department of Microbiology documented the first case in which a recovered patient was re-infected with SARS-CoV-2, the virus that causes COVID-19, a finding that has important implications for understanding immunity and vaccination prospects for the disease. The case involved a young

and apparently healthy patient who was diagnosed with the disease for a second time, four and a half months after the first episode. Samples taken from the patient showed the viral genomes in each case belonged to different lineages.

- **New knowledge about transmission dynamics:** HKUMed scholars were involved in studies confirmed that virus shedding could begin several days before the first symptoms appeared. They also showed non-pharmaceutical interventions against COVID-19 and influenza, such as testing, contact tracing and population behavioural changes, could be effective controls with less disruption than a total lockdown. Another study found such interventions could shorten the serial interval of the virus over time, which can reduce the chance of transmission. An international study with HKUMed scholars showed containment measures were nonetheless effective, too, lowering the daily increase of new cases to less than five per cent within one month.
- **Potential drug targets and candidates identified:** An international team identified neutralising monoclonal antibodies as potential therapeutic and prophylactic options against COVID-19. A separate study showed the disease impairs dendritic cell and T cell function, which are involved in human immune defences and could be targets for treatment and vaccine development. An international study of 12,000 known drugs found 13 could be potential candidates for treating COVID-19.

Another study identified potential targets for broad-spectrum antiviral drugs to treat COVID-19 and other viral infections (namely, the P9R alkaline peptide and YxxØ-motif).

- **Symptoms and effects:** The SARS-CoV-2 virus was shown to infect neural progenitor cells and brain organoids and intestinal cells. Scholars also found that the eyes may be an important route of human infection.
- **Animal connections:** Research shows SARS-CoV-2 was probably circulating unnoticed in bats for decades, and that it demonstrably infects bat intestinal cells, as well as those of humans. Tests on two dogs diagnosed with COVID-19 suggested they had been infected via humans.

* From mid-April to mid-September 2020. See Bulletin Vol.21, No.2 for earlier findings.

For comprehensive and regularly updated reports on our substantial body of COVID-19 research, please visit:



MIND THE GAP

A five-year research study on learning and assessment of digital citizenship in Hong Kong has shown a wide gap in competence levels across and even within schools. It is also proving prescient, given the arrival of COVID-19 and the sudden necessity for widespread learning online, and this has sparked a new study on how schools are coping.

Professor Nancy Law, Deputy Director of the Centre for Information Technology in Education, is leading an interdisciplinary team in a five-year longitudinal study – Hong Kong Students' Digital Citizenship Development. The first wave of results has shown up serious differences in students' digital abilities, both within and across primary and secondary schools in Hong Kong. The report's findings had only just been published earlier this year when the COVID-19 outbreak became a pandemic and schools across Hong Kong were suspended.

"We had no idea that the course of events locally and globally would have changed so drastically as to push digital citizenship issues to the forefront," said Professor Law. With COVID-19 closures rapidly overtaking events, Professor Law and Dr Tan Cheng Yong,

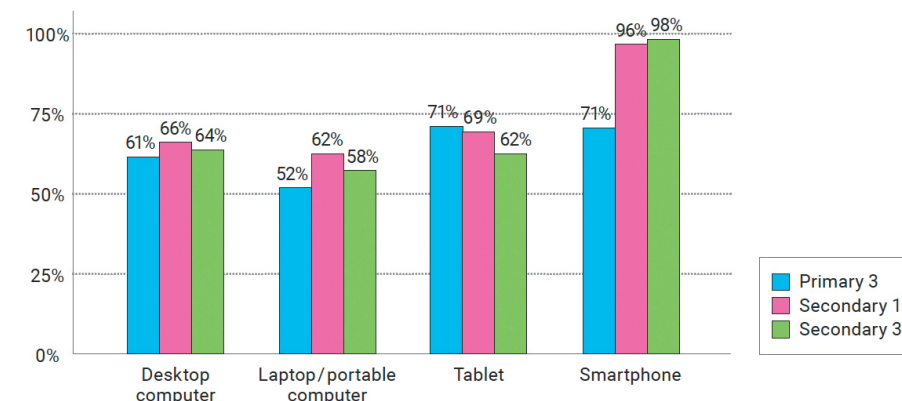
from the Academic Unit of Social Contexts and Policies of Education, embarked on the eCitizen Education 360 study between June and July this year, when schools briefly reopened, giving them the chance to see how schools had coped. The new study was supported by 1,200 teachers, 1,300 parents and 6,000 students from primary, secondary and special schools.

Given the initial results of the first project, it is perhaps ironic that the consequence of COVID-19 has not all been negative since it has forced all schools and teachers to take some action towards using digital, online means to carry out their educational functions. "We have seen great leaps in the digital competence of students and teachers alike, and the adoption of new tools and digital pedagogy by teachers," said Professor Law.



Findings from the study of Hong Kong Students' Digital Citizenship Development suggest that COVID-19 may widen the digital divide among students and schools.

Percentages of students with access to different digital devices at home



The study shows that a majority of the students in all cohorts had access to desktop computers, laptops and tablets at home, but most of them had to share these devices with others.

Conversely, several serious challenges have emerged from this sudden switch to a totally online provision of education.

"The levels of school preparedness for using technology to provide online learning and teaching are hugely diverse. Students who are studying in unprepared schools are very much disadvantaged. In fact, we found that there were huge digital competence divides across schools before the pandemic, and this is likely to be associated with the level of preparedness for e-learning when the pandemic hit. If this situation is not addressed, the disadvantage brought to students in unprepared schools will only increase."

Social economic status

The digital divide (in terms of digital competence, access and family support) that the Digital Citizenship study revealed before COVID-19, is often associated with social economic status (SES) divides. "These cannot be addressed simply by ensuring that all students have adequate access to large-screen devices and internet connectivity," said Professor Law.

"Low SES students may not be able to overcome the competence divide to make use of the technology for online learning. They also may not have a quiet place to take part in online learning. This is also why we used '360' in the title of our new project –

to address these issues we need all-round multi-sector engagement from the community."

This raises the question of what can be done next, given that COVID-19 seems likely to be here for some time. Professor Law believes that schools need to develop a comprehensive e-learning strategic plan that includes the capability to conduct fully online and blended learning for students to maximise the educational benefits of digital means of learning both during times of social distancing and when that is not necessary. This includes the setting up of appropriate information and communications technology infrastructure in the school to support online and blended teaching and learning.

"They should also take steps to identify students in need of help. There is an urgent need to provide technology access and accompanying support," said Professor Law. "Partnerships should be forged between schools and community organisations to bridge these gaps."

Discriminating power

An unexpected finding from the eCitizen Education 360 study was what Professor Law describes as "the discriminating power of one indicator" – where a school's decision to participate in a Bring Your Own Device (BYOD) scheme appears to have triggered

UPCOMING REPORTS FROM eCITIZEN EDUCATION 360

The first batches of results from the study were published in July and August, and Professor Law and Dr Tan plan to release four further research bulletins about different aspects of the data, namely: teachers' online pedagogies and challenges; implications for professional learning school leadership; preparing for agile transitions and integration of online, blended and offline learning; emotions and stress in adversity; building the resilience of schools and communities; and building a comprehensive connected learning support network for quality education and digital citizenship.



PROFESSOR NANCY LAW

“We found that there were huge digital competence divides across schools before the pandemic, and this is likely to be associated with the level of preparedness for e-learning when the pandemic hit. If this situation is not addressed, the disadvantage brought to students in unprepared schools will only increase.”

EASY WARNING SYSTEM

New scale gives quick warning of the likelihood of relapse in schizophrenic patients.



A team led by Professor Ng Siu Man in the Department of Social Work and Social Administration, have made a major breakthrough in the detection of risk and prevention of relapse in schizophrenia with the development of an innovative assessment scale. Unlike existing assessments, the self-report scale is concise, takes only two minutes to complete and yields results immediately.

Professor Ng started working on a new scale – called the Concise Chinese Level of Expressed Emotion Scale – because of a long-held commitment to enhancing the outcomes of schizophrenia, a serious mental illness with psychotic symptoms including auditory hallucination and delusion. The illness is often chronic and more than 70 per cent of patients in Hong Kong’s psychiatric hospitals and community mental health services are people with schizophrenia.

“A crucial task in the treatment is to minimise relapses which are a life-long threat to persons suffering from schizophrenia,” said Professor Ng. “In the development and validation process of the assessment scale, I worked closely with the Departments of Medical Social Work and Psychiatry of the Eastern Hospital.”

What the scale identifies is high ‘expressed emotions’ (EE) by the patient’s family, which, together with drug non-compliance, is the biggest risk factor for a relapse. Expressed emotions are recognised as a measure of the family environment based on how relatives of a psychiatric patient spontaneously talk about that patient.

“High expressed emotions can be defined as family members engaging in behaviour such as emotional over-involvement and protectiveness of the patient, hostility or over-criticism,” said Professor Ng. These are the crunch factors signalling a possible relapse, which can be treated, for example, by family therapy and psycho-education, if seen early enough.”

Indicator of behaviour

A measure of the EE criterion gives an indicator of the behaviour and attitudes and coping mechanisms adopted, and high EE attitudes of family members are considered as a significant determinant of recurrence in the short term in schizophrenia.

The most widely used existing scale is the Camberwell Family Interview (CFI) assessment, which was established in 1965 by George Brown and Michael Rutter while working at the Institute of Psychiatry in Camberwell, London. For the CFI, the initial test interview takes one to two hours and needs to be carried out by specially trained staff working with the patient plus a family member in a clinical setting. The interview is audiotaped and then assessed by other trained staff, with each assessment also taking several hours.

“CFI is the best established assessment tool and is widely regarded as the gold standard in identifying family high expressed expressions,” said Professor Ng. “However, CFI is impractical for psychiatric clinics and community mental health centres which

don’t have the expertise and/or time to administer the tests. Moreover, performing CFI requires the cooperation of a family member, which is not always possible.”

By contrast, Professor Ng’s assessment tool only takes the patient a few minutes to respond and does not require the involvement of family members. “The clinics/ community mental health centres don’t need specially trained staff to use it,” he said. “It has high agreement with CFI in detecting family high expressed emotions.”

The scale took 10 years to develop and underwent two phases of validation. In the first phase the team recruited nearly 300 patients for refining the scale and making sure it is concise enough and comprehensible to people with chronic schizophrenia, and in parallel has excellent basic psychometric properties, such as a robust factor loading pattern and high internal consistency.

“In the second phase of validation, we successfully followed 101 patients for one year,” said Professor Ng. “Using CFI as our benchmark, the 12-item scale achieved 90 per cent accuracy in identifying high EE. Moreover, it has been shown to be highly predictive of elevated relapse rate – patients whom the scale revealed as being in high EE families showed a one-year relapse rate 6.3 times higher than those not.”

The scale has already been successfully implemented in psychiatric treatment and rehabilitation units in Hong Kong, and has been adopted by overseas institutions

including Peking University, National Taiwan University, Taiwan Mental Health Social Work Society and the Fuhong Society of Macau.

Professor Ng is continuing work on refining and adapting the scale. “Cultural factors play a key role in determining the cutoff point for various factors on the scale,” he said. “For example, in our Hong Kong Chinese sample, the cutoff point for ‘Emotional-Over-Involvement’, which is a component of family high expressed emotions, is 15 on a scale with a range of 4 to 16.

“Such a cutoff point is extremely high, which seems to reflect Chinese families’ tolerance with high emotional involvement. I expect this cutoff will be significantly lower in cultures which are more individually-oriented rather than collectively-oriented. I am currently pursuing validation of my tool in different cultures.”



PROFESSOR NG SIU MAN

“
The scale has been shown to be highly predictive of elevated relapse rate – patients whom the scale revealed as being in high expressed emotion families showed a one-year relapse rate 6.3 times higher than those not.”

FACIAL RECOGNITION: THE NEXT PHASE

Dr Ping Luo helped develop a facial recognition system that has outperformed competitors from Google and Facebook and that he is taking to the next step by applying it to social relationships and fashion.

A decade ago, facial recognition technology that used artificial intelligence (AI) and computer vision was still largely confined to the laboratory. That was about to change and among the pioneers was Dr Ping Luo of the Department of Computer Science.

Dr Luo was doing his PhD at the time and his supervisors suggested that he apply deep learning to improve the accuracy of facial recognition. The outcome of his work included a facial recognition system that in 2014 outperformed submissions by Google, Facebook and others in the gold standard for human vision performance, the Labelled Faces in the Wild test.

“With conventional methods, you need to define the feature manually, such as the contours or boundaries of the face. With deep learning, it’s an end-to-end model that uses the raw data, which are the pixels, to automatically learn facial features. It discovers how to distinguish and represent a human face,” he said.

The system he helped develop, called Deep ID, was based on a unique dataset that he also helped compile, called CelebA. The latter has become the most widely used image database in the world for training machines to recognise faces.

CelebA is short for Celebrity Attribute Dataset and it is based on about 200,000 images of celebrities that were collected from the Internet. Human researchers labelled

attributes such as hair styles, eye and mouth shapes, and expressions such as smiling, and this information was fed into Deep ID.

Better than humans

CelebA has been cited more than 2,700 times by other AI researchers, but there is a downside: it has also been used to generate fake images that are so realistic, even humans cannot tell they are fake. “Unfortunately, there are many fake videos based on this technology. So we are also doing research on a system that would detect if an image is fake or real,” Dr Luo said.

The facial recognition system, meanwhile, has been picked up by government clients, metro operators and retailers in Mainland China through the start-up SenseTime (founded by one of his PhD supervisors, Professor Tang Xiaoou), where Dr Luo worked for five years before joining HKU in 2019. It has been used for such things as enabling people to use the metro or pick up items from shops based on facial recognition, without the need for money or a card.

Dr Luo acknowledges people may have privacy concerns, but points out that facial recognition is already part of everyday life around the world through smartphones. Apple phones, for instance, have facial ID. “Facial recognition application is very active in mobile computing and it can also be useful for other purposes,” he said.

Apart from recognising faces, Dr Luo has also completed a General Research Fund (GRF) project to develop technology that analyses social relations between people, such as whether they are friendly or competitive, based on facial expressions. This could help people who have difficulty understanding human emotions and assist in the development of robots that are better at interacting with humans.

“With Deep ID and CelebA, we focussed on a single human face. Here we have been looking at both photos and videos. Our proposed algorithm was state of the art and we want to invite others to improve its accuracy,” he said.

Exact match

Dr Luo has also applied AI to fashion, developing the DeepFashion benchmark that can help users find clothes online based on a single image, such as a photo of a celebrity wearing a desired pair of jeans. The matching accuracy is very high.

“We consider each piece of clothing as an identity. Just as we identify the human face, we can assign an identity to a single image of clothing,” he said. “This is much more difficult than labelling a human face, which has a regular structure and components.”

The database underpinning DeepFashion includes more than one million images of clothes, which were labelled by more

than 500 people over three months. Key ‘landmarks’, such as colour or shoulder type, were applied to each image. In the first phase, only a maximum eight landmarks were identified but the recent second phase has up to 50 landmarks per clothing item. The aim is to have an exact match, not a ‘similar’ item.

Moving forward, Dr Luo is interested in exploring the theory of deep learning and extending its application to other areas, particularly reinforcement learning which is used to build decision-making systems in robots. Some of his students are also investigating its use in self-drive cars.

These achievements led to Dr Luo being selected one of 20 Innovators Under 35 in the Asia Pacific region this year by MIT Technology Review. “It was a big surprise for me,” he said.



DR
PING LUO

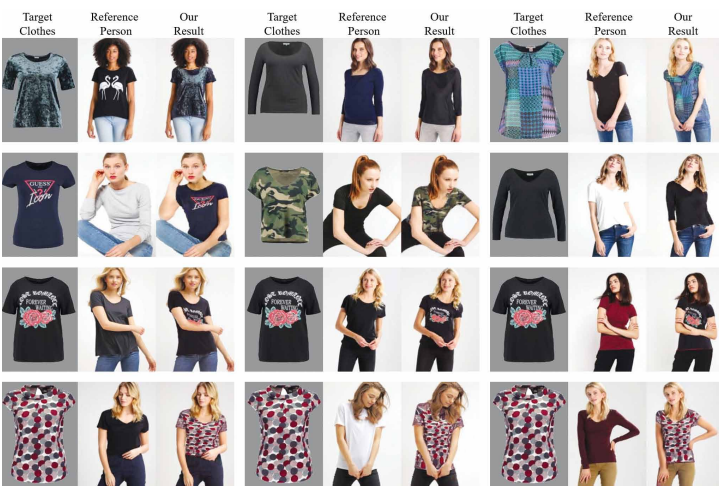
“Unfortunately, there are many fake videos based on this technology. So we are also doing research on a system that would detect if an image is fake or real.”



CelebA is a large scale benchmark of human face images, which are widely used to build AI systems for various tasks such as face recognition, face emotion recognition and face image editing and generation.



DeepFashion2, an advanced version of DeepFashion, is a large scale benchmark of fashion images, enabling a full spectrum of tasks of fashion image understanding such as fashion retrieval, landmark detection, virtual try-on.



A virtual try-on system has been built using the DeepFashion2 data. These results may enable hyper personalisation fashion design and production in the future.

SEX AMONG THE MASSES

Professor Wu Cuncun has been digging out lesser-known songbooks and storybooks from Imperial China that offer a window into the sex and material lives of the lower classes.



Illustration from the Ming dynasty homoerotic short story collection Longyang Yishi.

Erotic literature in traditional Chinese society is famously associated with *The Plum in the Golden Vase*, or *Chin P'ing Mei*, which explicitly details the sexual goings-on of a wealthy merchant with multiple wives and concubines. But merchants and scholars did not have a monopoly on erotic or pornographic literature in Imperial China. As Professor Wu Cuncun, Head of the School of Chinese, has discovered, the lower classes were also keen to record passionate and lovelorn events of their lives.

Professor Wu has researched extensively about same-sex love in China under the Ming and Qing dynasties and recently has been exploring the love lives of lower-class women in the late Imperial era as reflected in their songbooks.

Pornography and an appreciation of the lives of commoners started to take hold in China in the late 16th century when the country was in the nascent stages of modernity. Alongside growing urbanisation and individualism, “suddenly many literary works appeared that are quite erotic and more focussed on common people rather than only the upper class. People started to realise that everyone has a life and pleasure is important,” she said.

These works are revealing of their society. In same-sex erotica, Professor Wu found a strong divergence in the motivations of the elites – who viewed homosexuality as a pure form of love unencumbered by social duties such as marrying for connections – and the lower classes. The short-story collection *Longyang Yishi* tells stories from the perspective of male prostitutes who mostly came from poor families and were preoccupied with money, not love.

“There are stories about how to cheat the clients, how to make more money. There are also stories about how prostitutes got cheated – they are promised big money and then the client escapes just after sex without paying. Money is very important to them to buy clothes, which are their main form of property,” Professor Wu said.

“These men did not have much dignity because even though traditional Chinese

society did not consider homosexuality to be a moral sin, they still discriminated against the passive role of the male prostitute.”

‘Bun booth books’

The sexual and gender concerns of the lower classes in Imperial China are not easily uncovered. In addition to homosexuality, Professor Wu has also been investigating the lives of lower-class women as contained in songbooks that are full of the language of the street – as well as abbreviated versions of Chinese characters.

The songbooks are palm-sized and only four to 12 pages long, bound cheaply in glue rather than thread, and printed on the same kind of paper used to wrap buns. They were sold from bun shops, giving them the name ‘bun booth books’ (*mantoupu ben*).

Professor Wu first learned of them only in 2018 while researching erotic literature at a library in St Petersburg. “It was a big surprise for me because I had never seen books like this before. I discovered that there had been almost no research done on them,” she said.

She has so far tracked down songbooks in libraries in Russia, Japan, Taiwan and Beijing that date from the mid-1800s to the 1930s and contain songs and poems about women's lives, including adultery, sex before marriage, pregnancy and illegal births. “These are mostly very sad songs about falling in love, not being able to marry, and giving birth. Sometimes they keep the baby, sometimes they kill the baby,” she said.

Miserable but more free

But despite that misery, the songs also reveal that lower-class women had more social space than their upper-class counterparts, who were confined to home.

“In these stories, you can find the woman not only works at home doing the cooking and so on, but she also labours in the field. She helps bring home the bread, so she has a say in the family. Because of this, if the woman has an affair, sometimes the husband can't do anything about it,” she said.

The joys and sorrows of extramarital affairs are a common theme. In one song, for instance, a woman is visited by her lover then gives him money for a meal and a donkey ride home because she wants him to have comfort, then she cries because they cannot live as man and wife.

Although the songwriters' names are not included in the bun books, the fact that they take the women's perspective persuades Professor Wu that these are indeed women's songs. “These are original voices from lower-class women about their sexuality and social life. They aren't elite women's stories or stories retold by men,” she said. She continues her search for bun booth books in collections around the world.



PROFESSOR WU CUNCUN

“Suddenly many literary works appeared that are quite erotic and more focussed on common people rather than only the upper class. People started to realise that everyone has a life and pleasure is important.”



Cover page from the songbook A Girl Went to Buy Woolen Thread.

CITY SQUEEZE

China's accelerating urban redevelopment has encouraged local governments to let landowners share in the profits, but it has also exacerbated inequalities.

In 1956 a giant iron and steel factory opened in Wuhan that was so important Mao Zedong visited it twice. Tellingly, the plant was situated in the centre of the city – an example of socialist city planning that places factories and giant squares at the centre of civic space, rather than the high-rises of market economies.

Today, the landscape of Wuhan and other cities in Mainland China has completely transformed. Skyscrapers have mushroomed alongside economic reforms. Along the way have been winners and losers, whose fate has been tracked in a multi-disciplinary Collaborative Research Fund project led by Professor George Lin Chu-sheng of the Department of Geography.

"Anyone would be impressed by the dramatic landscapes in the cities, but how do you make sense of the changes from old to new? Who made the decisions? Who bore the costs and benefits?" he said.

"This is a story that needs to be told that should also have important implications for policymaking. Redevelopment obviously improves efficiency of land use, but has the benefit been shared by all of the stakeholders?"

The project focusses on five cities – Beijing, Shanghai, Wuhan, Guangzhou and Shenzhen – and identifies key factors that may determine if a project succeeds. Failure

takes a human as well as economic toll, as communities resist through protests and some people even commit suicide.

Starting a project on an economic upcycle is the most obvious contributor to success – the parties have more to gain. But bureaucratic and cultural matters have an impact, too.

Open to manipulation

Theoretically, all land is owned by the national government, which entrusts municipal governments to claim its property rights. Initially, the two governments divided land redevelopment profits between them and gave nothing to the original land users, but this meant land users had little incentive to cooperate. Guangzhou therefore introduced a reform to let land users retain 60 per cent of the profit. The initiative received Beijing's approval.

But projects also have to overcome cultural issues at the neighbourhood, or 'village', level. These 'villages-in-the city', often located in central areas, were established by people from similar ancestral lineages so they could be closer to work. If there are only one or two ancestral lineages in a village, they tend to take a united stand in negotiating with developers, who are key providers of funds for redevelopment projects. But if there are more lineages, they can become vulnerable to manipulation by developers who pit one group against another.

"When you have four different ancestor groups sitting together to make a decision and decide what developer to involve and who will get what, and there are developers manipulating behind the scenes, you can have a problem of resistance [to redevelopment]. Whereas if the village has a relatively consistent and simple lineage structure, it's more straightforward," Professor Lin said.

The research has also revealed how villagers try to improve compensation for their property by gaming the system. For instance, after learning their village may be redeveloped, some villagers have quickly increased their building height to five or even 10 storeys to get more compensation (the legal limit of compensation is supposed to be three storeys). "In Shenzhen, there are many stories of people who became millionaires overnight because they increased the height," he said.

Benefits not shared equally

The municipal government response to this has been telling. In Beijing and Wuhan, villagers who add storeys receive no additional compensation because these are considered illegal structures and the villagers must bear the cost of taking them down. Guangzhou will allow a small amount of compensation to cover illegal construction costs. In Shenzhen, the additional floors are eligible for full compensation.

The landscape of Wuhan has been completely transformed as old buildings have been demolished for urban renewal.

"This reflects the interaction of the state and society. In Beijing, the state overwhelms society – you are supposed to be disciplined and obedient and there is no allowance for any illegal activity. Shenzhen is the other extreme. You have a very weak state and a very powerful society and market," he said.

The weakest parties, though, are migrant workers who do not hold local *hukou* permits. They often live as tenants in the villages (and build the high-rises that replace them) and are considered outsiders, ineligible for compensation from redevelopment.

"The migrants can't afford to live in the new high-rises there and they can't afford to live in

the suburbs and commute every day. Basically, they are pushed out of the city. There is an attitude that they are not supposed to be there in the first place. The migrants are the biggest losers in China's urban redevelopment," he said.

Similarly, while large municipalities are winners because the redevelopment process has generated considerable amounts of tax revenue, the central government has not benefited to nearly the same extent. "The improved efficiency [of land use] and increased wealth generated by redevelopment have not been equitably shared by the different stakeholders," Professor Lin said.

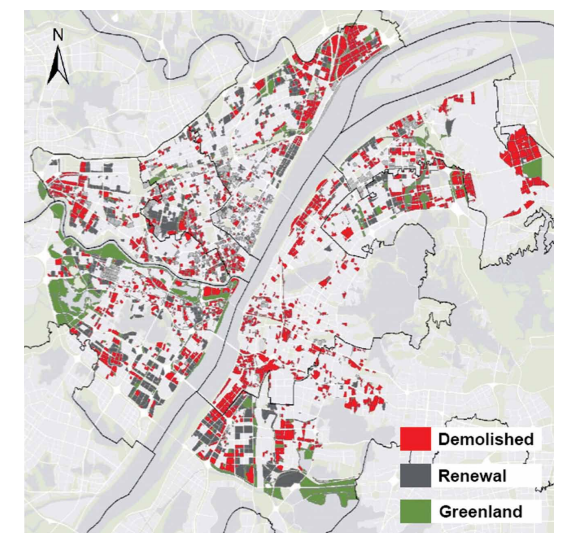


**PROFESSOR
GEORGE LIN
CHU-SHENG**

“ *The migrants can't afford to live in the new high-rises there and they can't afford to live in the suburbs and commute every day. Basically, they are pushed out of the city.* **”**



Professor Lin's team carried out field work in Guangzhou in 2017.



The above map shows the urban redevelopment in Wuhan, China – areas shaded in red are demolished areas; areas shaded in grey are renewal areas; areas in green are greenland.

DRAWING RHYTHM FROM THE ALGORITHM

Dr Hu Xiao of the Faculty of Education has used data analytics to develop systems that can retrieve and recommend music for modulating people's emotions and evoking behavioural and physiological responses.



Dr Hu Xiao has a unique understanding of the power of music. For more than 15 years, she has used data to unleash new possibilities from music. Two groundbreaking models she developed automatically recognise the mood of music and have received hundreds of citations and inspired multiple lines of research around the world. Now, she is investigating whether music can be used to enhance learning.

"Music can do a lot of things in people's lives and we are trying to expand that field, not only just in terms of recommendations or algorithms, but in trying to see how it can be applied in different areas," she said.

Her interest in music information retrieval began while she was a postgraduate student at the University of Illinois. An early study she did looked at how people use music for different activities and occasions, such as housework and dating – with one finding being that quiet, soothing music and energetic music were both popular for romance, possibly indicating different preferences between genders or age groups.

That work inspired her to look more systematically at the seemingly intangible topic of emotion in music. Dr Hu developed a model that was trained to recognise emotion in songs based on data analytics that aggregated musical aspects – such as rhythm,

harmony and lyrics – with people's responses to the music on social media. This model was then tested on new songs and had a nearly 70 per cent accuracy rate in matching song to mood.

"Accuracy is a hard problem in this field because different people may respond differently when asked how they feel about the same piece of music. Some people even argue that each piece can express multiple emotions. So about 70 per cent accuracy is a very good performance," she said.

Key and tempo effects

More recently, Dr Hu has been looking at how to use the algorithms of music to enhance learning, which aligns with the mission of her Faculty and her division, the Academic Unit of Human Communication, Development, and Information Sciences.

An early result from that research is that when people read while listening to the background music of their choice, they tend to read more slowly but to find the experience more pleasurable. Another experiment that manipulated different aspects of the music, such as tempo and major or minor mode, found fast-paced music in a minor key helped participants be more engaged in reading than a slow-paced piece in a major key.

Dr Hu is also using wearable devices to track people's physiological responses to music selected by researchers, particularly heart rate and blood pressure. After each song, listeners were asked to rate their emotion and answer other questions. The aim was to check the accuracy of the music information retrieval model.

"We found that adding physiological signals could improve the accuracy of the model's recognition of emotion in music, but not as accurately as the users' personality assessments, which were carried out before the experiment," she said. Users were assessed on such things as extroversion, openness and conscientiousness.

"This has led us to hypothesise that the effects of music recommendations on things like background music reading may differ for different personalities."

Just getting started

She plans to assess the effects of music on learning mathematics and writing, too, and she is analysing interviews with university students about what music means to them.

Dr Hu noted that music information retrieval is still a young field, but with great potential. Other scholars are drawing on her initial findings by using music algorithms to help

Parkinson's disease patients find their pace when walking, to understand the rhythms of the heart, and to identify patterns and differences in birdsong over time.

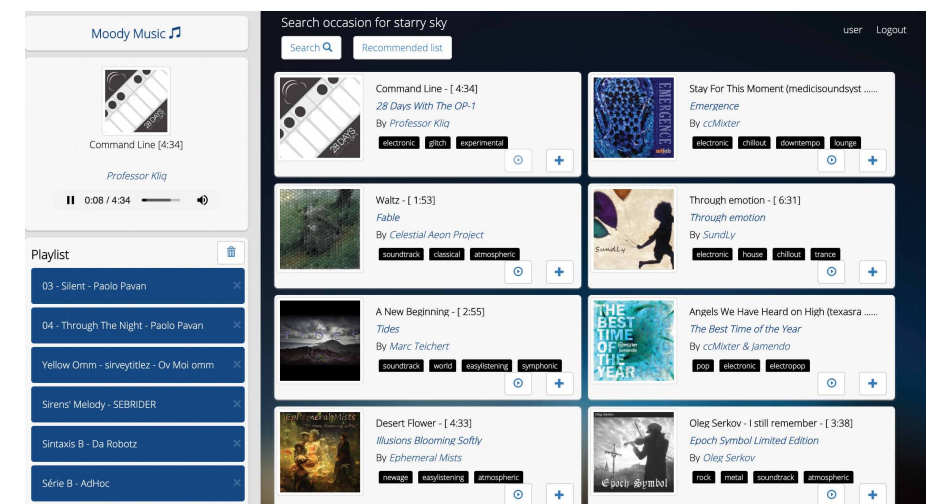
Given that potential, she is keen to have more scholars join her field, particularly women.

"This area is dominated by computer scientists and engineers and most of them are men. I served on the board of the International Society for Music Information Retrieval for six years and we are striving to achieve gender balance. I have also been a mentor for several years. We welcome newcomers – not necessarily in terms of age but in being new to the field. We encourage them to contribute," she said.

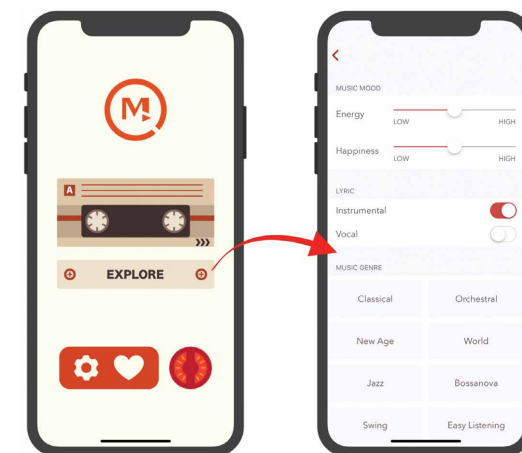


DR HU XIAO

“Music can do a lot of things in people's lives and we are trying to expand that field, not only just in terms of recommendations or algorithms, but in trying to see how it can be applied in different areas.**”**



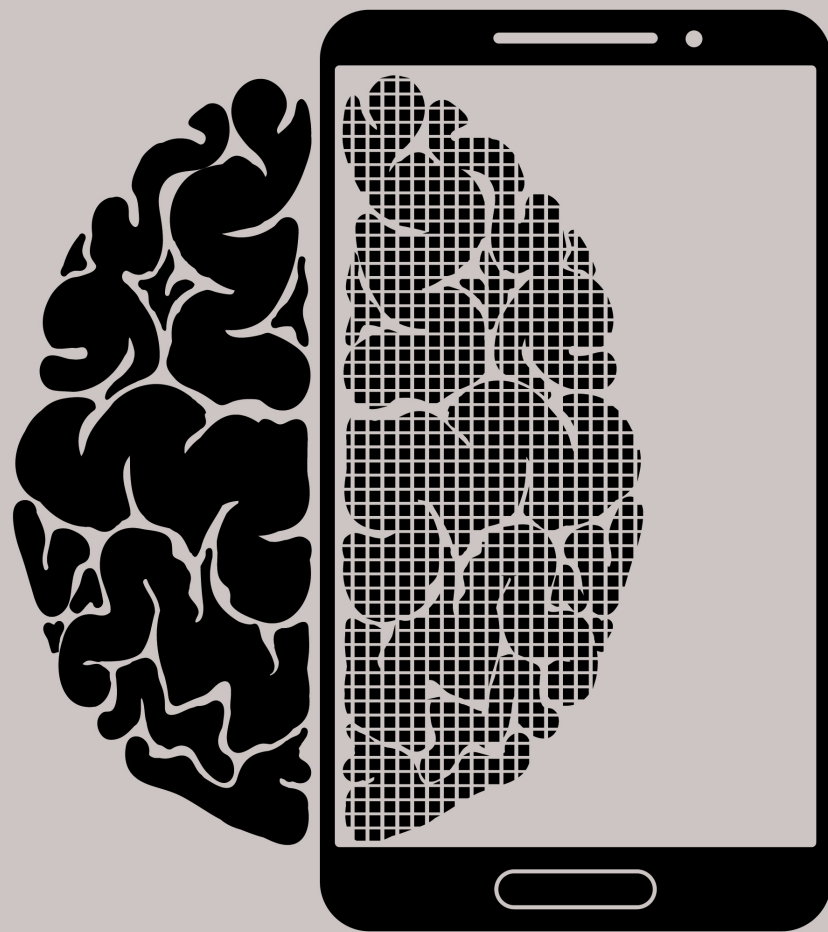
Developed by Dr Hu's team, Moody is a web-based music streaming service supporting music search.



The Moody mobile app for facilitating music discovery in learning scenarios.

FEELING BORED? PAY ATTENTION TO THIS

Boredom tends to arise when we stop paying attention to the task at hand, say HKU psychology researchers. The easy distraction of the smartphone is not helping.



Dr Christian Chan's least favourite emotion is boredom. To keep boredom at bay, he has kept his research pursuits varied and wide-ranging, from sleep and mentoring to the impact of natural disasters on mental health. And like many people, he has also turned to his smartphone to occupy his time. But these experiences have left him wondering, what happens when we are no longer bored?

That question has inspired a new line of research that Dr Chan is overseeing with his PhD student, Ms Katy Tam Yuen-yan. They have published several studies, with more in the pipeline, that seek to understand the nature of boredom.

One clear result is that boredom arises when we stop paying attention to the task at hand, as many people with solitaire or other games on their work computer might recognise.

"Theoretically, if you are fully engaged in a task, you can't feel bored," he said. "The opposite of boredom is full attention engagement – some researchers liken it to psychological flow, when you stop noticing the passage of time."

A shift in attention does not necessarily result in boredom because attention can shift back to the task. But if the task is not meaningful or rewarding, there is a good chance boredom will arise.

Dr Chan and Ms Tam provide evidence for this in a study that sampled participants' mood and experience five times a day, at random times, over seven days. Each time they were asked to indicate what they were doing, how they were feeling and whether they were with other people. Sadness and personality traits were controlled for. As expected, those engaged in less meaningful tasks tended to feel more bored.

Bored in a crowd

"What we found was not rocket science: if you perceive that what you are doing is not meaningful, then you are more likely to feel

bored. But interestingly, if you are doing that not-meaningful activity with other people, the likelihood of your feeling bored is even higher," he said.

"Our explanation for this is that when other people are with you, you have the expectation that you shouldn't feel bored. So when you do feel bored, it's worse."

They also looked at boredom in schools, using a similar design to question students and teachers in the moment. Oddly enough, students who perceived their teachers to be bored were more likely to feel bored themselves, even if the teachers had said they did not feel bored. "We can't say whether students were projecting, but in any case, there is this disconnect between how teachers felt and how students rated teachers' feelings," he said.

Other studies are underway to look at the theoretical underpinnings of boredom in terms of what sets it off, how it evolves and the consequences, and the link of boredom to smartphone use.

"Boredom has a function because if we don't feel bored, then we might do the same thing repeatedly, even if it is not rewarding. Or we might not be able to shift our attention to more meaningful tasks," Dr Chan said.

"But if we are avoiding boredom at all costs, that might create a habit of not sustaining attention, or not being able to delay gratification, or not exerting the time and energy required to excel."

Phones keep you hooked

This is where smartphone use becomes a worry. Smartphones and apps are designed to hold people's attention and keep them stimulated.

"If you start to feel bored with the task at hand and you are used to shifting it to your phone, which helps you get rid of the unpleasant feeling of boredom, then you are negatively



According to Dr Chan's study, the feeling of boredom is more likely if one perceives that what one is doing is not meaningful, and if that not-meaningful activity is done with other people, the likelihood of feeling bored is even higher.

reinforcing the self-distraction. This is simple behavioural theory. I suspect that over time, this may get generalised to pulling out your phone when attention shifts, even before the feeling of boredom arises," he said. He and Ms Tam are now doing experiments to monitor people's smartphone use when they are placed in boring situations.

They are also trying to address the idea of chronic boredom, which leaves people feeling bored over long periods of time – something they think may be due to the expectation that life should be stimulating and meaningful. Mobile devices may also have a role here.

"It's a vicious cycle. Our brains like novelty, especially visual novelty, and here you have a screen stimulating you visually and demanding your attention. It's training you to crave quick, rapid changes. Real life, in contrast, gets less interesting.

"The smartphone is so heavily engineered to make sure you keep using it that you can't

use your willpower to fight it. It's become the default strategy for how people deal with boredom as a feeling. But theorists are now suggesting that we shouldn't always try to get rid of boredom so reactionarily," said Dr Chan.



**DR
CHRISTIAN
CHAN**

“ If we are avoiding boredom at all costs, that might create a habit of not sustaining attention, or not being able to delay gratification, or not exerting the time and energy required to excel. **”**

TOWING THE LINE

An iconic boundary line drawn up in 1800s by a Victorian biologist to explain how and why land animals were distributed across the planet has been redrawn following a study of Christmas Island in the eastern Indian Ocean.



Alfred Russel Wallace (1823–1913) was a respected biologist, who divided the earth into six continental bio-realms. The divide between the animal suites on Australasia and Asia, now known as Wallace's Line, is especially notable with kangaroos, koalas and echidnas to the east, and tigers, orangutans and elephants to the west. It has largely been shaped by tectonic-plate movements – previously, these two land areas were separated by a vast ocean.

Christmas overlooked

Dr Jason Ali, Associate Professor of the Department of Earth Sciences, said: "When Wallace proposed the boundary, the little dot of land that is Christmas Island (it's slightly smaller than Lantau) was quite simply overlooked. But we discovered that most of Christmas Island's animal species have their origins on the eastern side of Wallace's Line and are in fact Australian. Redrawing Wallace's Line is the logical solution to the finding.

"Also, only with the modern analytical techniques where biologists look at an organism's DNA can they confidently work out its nearest blood relatives. The pioneering biogeographers of Wallace's time never had this luxury."

Dr Ali, who worked on the research alongside colleagues Professor Jonathan Aitchison and Professor Shai Meiri, from the University of Queensland and Tel Aviv University respectively, did not set out to dispute Wallace's theory.

"Our study initially had a geological focus," he said. "We were trying to work out when this rather unusual island, Christmas Island, that is just to the south of Indonesia, remerged. Its top was sub-aerial prior to about 16 million years ago. It then 'drowned' before popping back up about 5 million years ago due to the warping of the underlying tectonic plate it rests upon.

"There is just a handful of islands on Earth that have done this. Obviously, only when the body is exposed can it accommodate land animals. As I looked at the island's biological inventory, I realised that many of the native species

had ancestors that originated to the east of Wallace's Line. This is really weird because the landmass sits well over 1,000 kilometres to the west of this key biogeographical divide. They shouldn't be there!"

Dr Ali joined HKU in 1997, and for the next 10 years spent much of his research time working on geological projects in the Philippines, Tibet and south-west China in Guizhou, Sichuan and Yunnan provinces. About 12–13 years ago he became interested in biogeography – how life is distributed around the planet. "The key thing is that my geological background gives me insights into biogeographical systems that practically all of the biologists who work in the field do not have," he said. "Also, I am pretty much the only Earth scientist who works in the field, hence there are lots of key topics I can get stuck into with minimal competition."

He has worked for more than 20 years with Professor Aitchison, who was at HKU until 2011–2012 before he moved to Brisbane,

where he heads a large school. "I enjoy working with Jonathan because we look at problems from slightly different angles, so we can often uncover some neat things – it's like having stereoscopic vision of a problem. My connection with Professor Shai Meiri is somewhat shorter – two to three years. He's a biologist working out of Tel Aviv who studies mainly reptiles and amphibians. He makes sure that I don't do anything silly with the animal data!"

Southern end amended

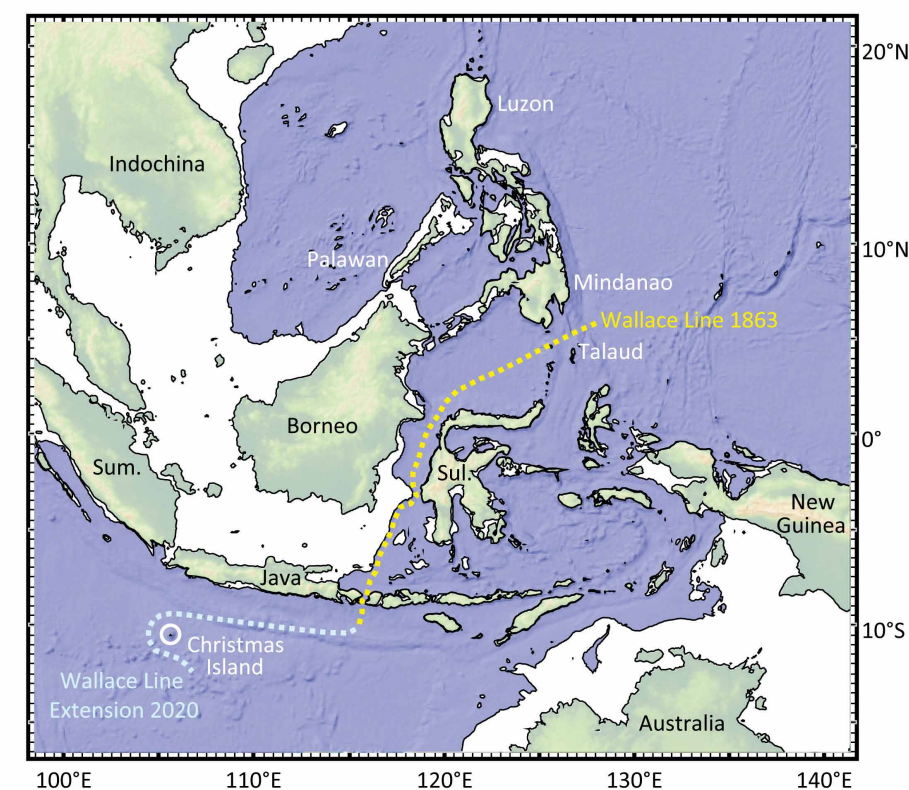
Dr Ali is careful to point out that the findings don't actually change the rest of the path of Wallace's Line – just its southern end, so the change is more like an amendment. "However, since the work appeared, I have had numerous requests for copies, which suggests that people are interested and/or intrigued. Hopefully, people will incorporate the findings into their studies of Christmas Island and the broader area.

"The finding forces us to think again about the barrier between two of Earth's most distinctive faunal realms," said Dr Ali.

As a follow-up, over the last few months he has been working on a major review of the development of ideas related to the biogeography of the Indo-Australian Archipelago. "Following Wallace's publication, many people proposed their own divides and transition zones for the region," said Dr Ali. "It's really complicated and messy, so I thought why not deconstruct it? The manuscript's working title says it all: *Wallace's Line, Wallacea, and associated divides and areas: a tortuous tangle of ideas and labels.*"



DR JASON ALI *The finding forces us to think again about the barrier between two of Earth's most distinctive faunal realms.*



Wallace's Line has been redrawn based on the discovery of Australasian-derived species on Christmas Island.



Dr Ali's research paper titled 'Redrawing Wallace's Line based on the fauna of Christmas Island, eastern Indian Ocean' was published in the Biological Journal of the Linnean Society.

LESSONS FROM E-LEARNING

Dr Timothy KF Hew has been studying student engagement in massive open online courses (MOOCs) for years. His findings offer pointers for teachers and students forced online due to the COVID-19 pandemic.



Dr Hew and his students in his online class.

Asking teachers to show their faces is an unlikely takeaway from research into online learning. Yet that is what Dr Timothy KF Hew of the Faculty of Education has discovered in the case of MOOCs.

Dr Hew has studied some of the world's top-rated MOOCs and did a textual analysis of feedback from more than 4,000 students, and found that putting a face to a voice and name was a key indicator of success because it signals teacher engagement. He believes the same principle could extend to online learning during the ongoing COVID-19 pandemic – for both teachers and students.

"A sense of connection to other humans is important for effective learning and this applies to online social presence, too. If you

show your face, then participants feel they are actually listening to and talking to a real person, not a blank screen. If everybody shows their face, it becomes a simple yet powerful way to heighten social presence," he said.

Dr Hew has required all students to keep their webcams on in his online teaching this year and received positive feedback. "At first it was not so popular with some students, but later they said it made them sit up straighter and pay more attention. They felt more engaged when they could see other people and looked at the computer screen rather than their phones."

'Bite-sized' learning

Using technology to deliver learning has been a focus of Dr Hew's research for two decades. He

studied software engineering before switching to education in his postgraduate studies and about 10 years ago started studying MOOCs. His main studies were published before the pandemic, but the findings are pertinent enough that one publisher has made one of his studies freely available online this year to help educators who are grappling with online teaching and learning.

Dr Hew has identified five important factors for online learning through MOOCs, including instructor accessibility and passion. Some of these parallel successful factors for in-person learning.

Top of the list is problem-oriented learning because it helps students derive meaning from the content. Dr Hew suggested teachers provide assignments where students can apply their learning and consider inviting guest speakers. For example, one MOOC on poetry invites a poet as guest speaker and arranges for students to send in questions.

Related to this is active learning, which helps sustain students' attention. This can entail frequent short quizzes over the course of a lesson, student reflections, or doing a version of the 'flipped' classroom where students do readings or watch a video before the online class, then apply that learning in class.

"The worst thing you can do is talk for two hours in front of the camera – everybody falls asleep in the first few minutes. It's better to talk for a few minutes then interrupt the video with questions that need to be answered before

continuing to the next video. Or give students a question to discuss or a game to complete," he said.

"I call this 'bite-sized' learning. It also can provide automatic feedback, which helps sustain students' attention and therefore helps them learn."

Just as good

Dr Hew acknowledges that the experiences of MOOCs are not always directly applicable to regular university classes, where students pay to attend, are expected to show up for class and receive grades at the end. But that means MOOCs face more challenges in keeping students' attention.

He has applied many of his findings to his own recent online classes, including keeping

webcams turned on, inviting guest speakers, flipping classes, keeping his talking times brief and letting students take a short break every 30 to 45 minutes during longer classes. He also advocates having regular 'office' hours online so students can contact their teachers one-on-one. Looking ahead, he is developing gamification and other strategies for future classes.

"Many people think online learning is the weak option compared to face-to-face teaching. But if done properly, it can be just as good," he said, pointing to a comparison he did between students who did his fully online class in the first part of 2020 and those who completed the same class mostly face-to-face class in the previous semester.

"Their grades were similar – they performed just as well even though one group attended classes fully online," he said. "My biggest

advice to teachers is to be more open and do not automatically think online teaching is inferior. It can be even more engaging than face-to-face."



DR TIMOTHY
KF HEW

My biggest advice to teachers is to be more open and do not automatically think online teaching is inferior. It can be even more engaging than face-to-face.

EDUCATION FACULTY OFFERS SUPPORT

Since the COVID-19 pandemic set in, the Faculty of Education has launched the 'LIVE to LEARN, LOVE to SERVE' Campaign with its staff and students offering advice and other help related to online learning, such as producing seven sets of physics teaching materials, providing real-time tutoring and tips for HKDSE [Hong Kong Diploma of Secondary Education Examination] students, offering workshops on doing creative projects and science experiments at home, and sharing online teaching experiences.



Learn more about the
'LIVE to LEARN, LOVE to
SERVE' Campaign



ANIMAL ATTRACTIONS

The popularity of commercial products made from whales and endangered animals has inspired a student-led project to raise awareness of the problem through a documentary and survey.

News stories about the atrocities inflicted on whales by the Japanese whaling industry inspired final-year Biological Sciences student Andy Vu Ka-hei to dig deeper into the problem. But the more he learned, the more he realised that whaling is not quite as clear-cut an issue as he had supposed. Livelihood, political and legal issues are involved, too, and there is a story to be told.

“Whaling is a deeply fascinating topic. It is not only an environmental problem, but equally a people problem because the livelihoods of people in the industry are at stake. It’s a political problem because there is large political backing behind the industry – the political seat of former Prime Minister Shinzo Abe is in the

whaling centre of Shimonoseki. It’s painted as part of Japanese ‘culture’, but only 4,000 tonnes of whale meat were consumed there in 2015.

“Whaling has also been caught up in international relations because foreign governments pressure Japan to stop. It’s a legal problem because it has been taken to international courts. And Japan has made it a scientific problem by setting up research institutions to produce pro-whaling research.

“As I learned more, I was dragged into a debate about the issue with myself. When I discussed it with my peers and academic advisors, they encouraged me to conduct an experiential learning project on the issue,” he said.

Learning to compromise

That project has involved creating a documentary and written article about whaling in Japan that received the top prize of HK\$10,000 in the 2020 HKU Horizons Experience Award and funding support from the Gallant Ho Experiential Learning Fund.

The project brought together 20 students from the Science, Arts, Engineering, Social Sciences, Business and Economics and Law Faculties, who did an extensive literature review, travelled to Japan, and conducted dozens of interviews with scholars, government agencies, businesses, NGOs and the general public in and outside of Japan.



An interview with Professor Joji Morishita (right), a highly prominent figure in the Japanese whaling industry, known for pushing forward Japan's international pro-whaling diplomacy.



Professor Joji Morishita (sixth from right) and the project team.



The fish auction market near Taiji, Japan, a town infamous for its dolphin and whale hunting practices.

The documentary is being finalised in preparation for submission to international film competitions. But apart from this output, the project has also provided the students with valuable learning experiences, particularly on working in a foreign culture.

“Cultural barriers and a lack of understanding on local social norms posed a challenge to us throughout our project,” said Andy. “We spent sleepless nights exchanging ideas about how questions should be asked of interviewees the following day. While our media team were interested in phrasing our questions to get specific answers, our translation team highlighted cultural norms. These struggles were often met with compromise.”

Sometimes they misjudged, for instance, by not being mindful enough of arriving on time for an interview, which unsettled the interviewee, and by using drones to film in sensitive locations, which attracted attention from police and local authorities.

“The soft skills we gained – working as a team, being culturally intelligent, resolving conflicts while enjoying the ride – are things that are often overlooked or undervalued in education, yet they may be the defining factor that determines whether we get an interview, more funding or even just finish a project,” he said.

Staying motivated

The whaling project also had a spinoff project to survey students in Hong Kong, Macau and Japan about the use of endangered animals in traditional Chinese medicine (TCM). The topic was suggested by the Japan Wildlife Conservation Society, who wants to be able to present the results at conferences, and the two projects were combined into one by the Gallant Ho fund.

Given the data-driven nature of the project, Andy invited Rohan Rajpal, a final-year Computer Science student who has a deep interest in animals, to join them. Under his leadership, the students managed to do surveys in Japan and Macau, but the COVID-19 outbreak put a halt to their Hong Kong survey.

Nonetheless, they gained useful experience working with an NGO, drafting questions and speaking with groups of students outside of Hong Kong and surveying them. The bulk of questionnaires were done in Japan, where students had a low awareness of endangered animal content in TCM but also reported low usage of TCM by themselves and their families.

“We were still able to educate students in Japan about the issue and our own participants also became more knowledgeable,” Rohan said. “This was one of the first big projects I have organised by myself and it was a great learning experience. I dealt with things that

I would not normally have had to deal with in an institutional setting, such as solving disputes between local and non-local students, keeping people motivated and keeping them disciplined at the same time. More importantly, it was comforting to know I was helping animals in some way.”

Rohan was motivated to join another Gallant Ho project, but it was also halted by COVID-19. “These are opportunities to do something that has impact, rather than be guided by academic results. I hope other students will be motivated to join efforts in future to protect animals,” he said.



MR ANDY VU
KA-HEI

“The soft skills we gained – working as a team, being culturally intelligent, resolving conflicts while enjoying the ride – are things that are often overlooked or undervalued in education, yet they may be the defining factor that determines whether we get an interview, more funding or even just finish a project.”

MINDFUL HEALTH

An award-winning interactive app called Hollo offers mental health tools for Hong Kong’s younger generation and support for therapists and NGOs using technology such as big data and artificial intelligence.

Described on its website as ‘a mental health companion for you and your therapist’, Hollo was first conceived three years ago as a solution for young people with mental health issues who tended to fall between the gaps when it came to getting treatment.

The concept came from Cameron van Breda, who is in his fifth year studying Molecular Biology and Biotechnology, with a minor in Science Entrepreneurship. “We felt mental health aid, and even mental health awareness, were not being talked about among the young,” he said. “In Asia, stress in academics and family life can be really tough on young people, and unfortunately suicide is not uncommon. I had lost one of my close friends when I started

building the project in 2018, and it solidified the idea in my head that this needs to be resolved.”

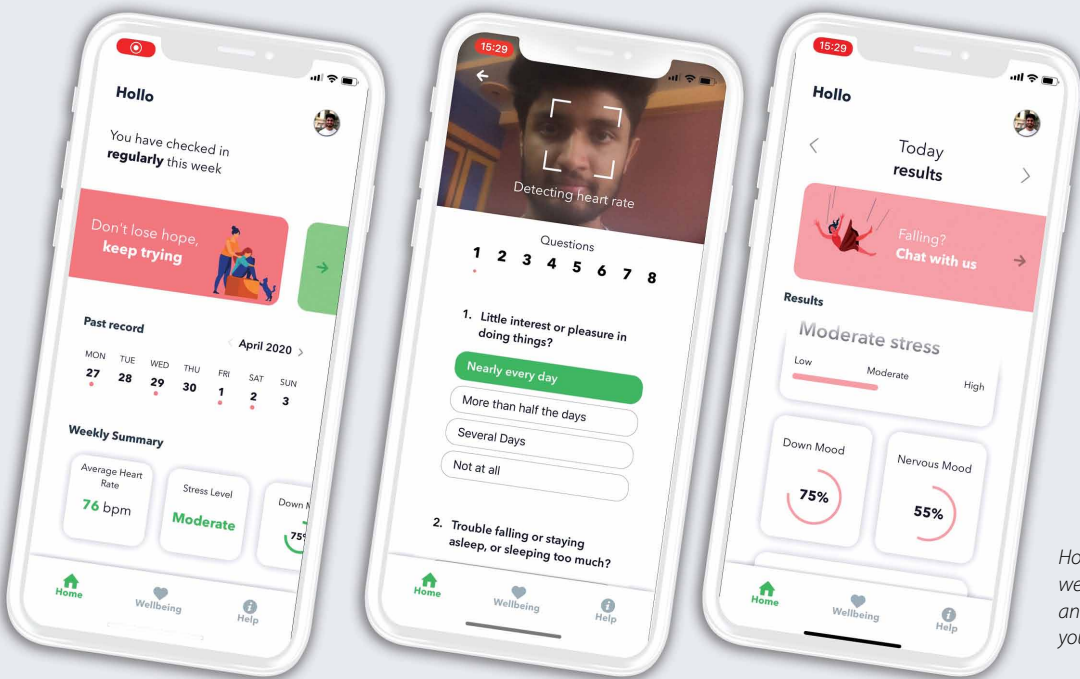
He teamed up with Piyush Jha, freshly graduated with a Bachelor of Engineering in Computer Science, and Ajit Krishna Namakkal Raghavendran who is in the fifth year of his Bachelor of Engineering in Computer Science course.

Key to their thinking was tackling the issue from two angles – that of the patient and that of the therapist – and to develop a tech-based, comprehensive mental health management tool, with an interactive mobile app for users and a case management dashboard for therapists and NGOs. It’s a collaborative and scalable mental health platform which aims to

cut the heavy cost of mental health care for youth and to make support more accessible,” said Ajit. “Our goal is to give users – whether they are going through stressful periods in life, or depression or anxiety – access to a tool that helps gauge their mental health and well-being easily through clear visuals and then suggests actionable steps.”

Record, review, react

“We designed our solution to go through a process of three steps,” said Cameron. “Record (the data points), Review (our simple dashboard), and React (to these highlighted patterns and mental health effects with actionable insights).”



Hollo is a mental health companion web application leveraging Azure analytics and AI services to advance youth therapy practices.



Hollo was named the 2020 Microsoft Imagine Cup World Champion – the first team from Hong Kong to take top honours since the launch of the Microsoft Imagine Cup in 2003.



Team members Cameron van Breda, Ajit Krishna Namakkal Raghavendran and Piyush Jha met at HKU.

“For example, when users complete their first screening and check-in, we record their expressions as they respond to a questionnaire that is aligned to industry standards. That video is then used for multiple purposes, namely, to attain the data points of their current emotional state, their sleep quality, their heart rate (as an indicator of current stress levels) and taking insights from their latest social media and responses.”

The team collate the results, and present users with a dashboard designed to be easily understandable. Using artificial intelligence (AI) and machine learning, they map out the user’s symptoms and create predictive models to understand a patient’s risks and potential relapses. “We then notify them of potential mental health issues and how to practise preventative measures either through self-care or by seeking professional help,” said Cameron.

On the treatment side of the equation, Hollo then feeds this data into a network of NGOs and counsellors so they can be alerted to potential high-risk cases without breaching privacy, and initiate the outreach to high-risk individuals. The team facilitate this relationship between the industry professionals and the users by allowing the counsellors to manage their cases on Hollo’s web-app platform. They also encourage NGOs and counsellors to enlist Hollo’s services to help digitally transform their standard practice.

“They can benefit from effective monitoring and be alerted to any changes in their client’s day-to-day status,” said Cameron. “This also streamlines the administrative process, and it is how Hollo will generate initial revenue as a software and service provider for the NGOs.”

Microsoft Imagine winners

Team Hollo has now made the leap from developing the app to launching a start-up, and along the way they have won several awards, including the Microsoft Imagine Cup – the first team from Hong Kong to win since the annual competition was launched in 2003. More than 28,000 students from over 200 countries entered the competition. Hollo’s prize included a mentoring session with Microsoft CEO Satya Nadella, US\$100,000 in prize money and US\$50,000 Azure grants which they used to launch their start-up.

Piyush said: “The most exciting moment for me was when Brad Smith [Microsoft President] decided to advance Hollo to the final round and praised us regarding the concept. It was a great feeling of accomplishment and the competition was a full-on learning experience. We came to understand the shortcomings of our app, pivoted our idea and, with the help of amazing mentors like Microsoft’s Brian Clark, understood how to pitch and present the idea in a way which truly reflects what Hollo is trying to achieve.”

MR CAMERON VAN BREDA

“We felt mental health aid, and even mental health awareness, were not being talked about among the young. In Asia, stress in academics and family life can be really tough on young people, and unfortunately suicide is not uncommon. I had lost one of my close friends when I started building the project in 2018, and it solidified the idea in my head that this needs to be resolved.”

THE HUMAN FACTOR

Since COVID-19 took hold, HKU’s Centre for the Humanities and Medicine has been working hard to bring the human dimension of the pandemic to the fore. Disease outbreaks aren’t just biological phenomena; they are also social, economic and political events.



“The Centre for the Humanities and Medicine (CHM) is unique as a hub that links science, public health, history and anthropology to address some of the biggest health challenges facing societies in Asia and globally,” said Professor Robert Peckham, MB Lee Professor in the Humanities and Medicine and CHM Director.

At times of pandemic crisis, understandably, the most prominent focus of attention is on the virus itself and on containing disease. A CHM priority is to complement this effort by seeking to understand the roles that human behaviour and broader social processes play.

Disease ecologies

“We need to ask: how do novel diseases emerge in the first place?” said Professor

Peckham. “How can we minimise the risks of future pandemics? What insights might history provide? Poverty, migration, urbanisation, industrial agriculture and anthropogenic environmental change more broadly – these are some of the variables shaping disease ecologies. Pandemics happen when biological worlds collide with social worlds. At the CHM we want to ensure the human side of the pandemic does not get sidelined.”

Knowledge exchange (KE) is key to the CHM’s mission and during the ongoing COVID-19 pandemic that has taken many forms. They have published on the human and social aspects of the pandemic in mainstream media and online forums, including *The BMJ*, *The Independent*, *Foreign Affairs*, *New Statesman*, *Prospect Magazine*, and *The Lancet*.

“We’ve also partnered with institutions to create content for public education projects,” said Professor Peckham. “For example, in February we produced with Bloomberg the short documentary *Can We Overcome Pandemics?*, looking at the social and environmental drivers of zoonotic disease.”

Another ambitious and ongoing initiative is their project to collate a broad spectrum of information on the pandemic: from infection data and medico-scientific discovery to sociocultural issues and experiences.

The motivation for the project, which is being overseen by CHM Senior Research Fellow Dr Ria Sinha, has come from the Centre’s core research work and teaching on infectious disease epidemics and pandemics, and the recognition that a slanted and singular narrative often emerges post-outbreak.

“Our aim is to bring together a wide array of mixed media materials that evidence the complex and ever-shifting nature of an infectious disease outbreak through time and space,” said Dr Sinha.

Focus on the social

“Most existing COVID-19 resource sites adopt a disciplinary focus, particularly in science and medicine, which means the social vanishes from view. In contrast, the COVID-19 project reflects the CHM’s commitment to interdisciplinary research and outreach.

We’re building an archive that cuts across specialties. It will be a valuable resource for researchers, journalists and others to draw on in the future.”

In the decade since it was established, the CHM has initiated numerous interdisciplinary research and outreach projects, particularly in the area of infectious diseases. In 2018–2019, the CHM advised the Wellcome Trust on the cultural project ‘Contagious Cities’, a collaboration between institutions in Hong Kong, New York, Berlin and Geneva that explored how infectious diseases have shaped the physical, social and cultural milieus of the global city. The project also sought to stimulate new thinking about epidemic preparedness.

CHM exhibitions have included *Fever: The History of Malaria in Hong Kong* at the Hong Kong Museum of Medical Sciences in 2016, and a photographic exhibition on campus last year featuring works by renowned anthropologist Charles L Briggs exploring the social aspects of a rabies epidemic in Venezuela entitled *Tell Me Why My Children Died: Searching for Justice in an Epidemic of Bat-Transmitted Rabies*.

Today, in the midst of COVID-19, the CHM has been deluged with emails from journalists, policymakers, international researchers and others interested in an integrated approach to the crisis. “People are looking for answers to the big questions,” said Professor Peckham. “Among

them: How did this happen? And, what will the social and political repercussions be of lockdown, isolation and social distancing? Now more than ever, there’s an appreciation that the challenges we’re facing aren’t just biomedical challenges, they are social ones, too. There’s increasing recognition that unless we grasp this, we’ll never make progress.”

This is where he feels the CHM shines. “Our track record in innovative research on the social and cultural dimensions of infectious disease, in tandem with our high-impact KE programme, is ensuring that HKU is leading the way when it comes to big-picture thinking about the current pandemic.”



PROFESSOR ROBERT PECKHAM

“Now more than ever, there’s an appreciation that the challenges we’re facing aren’t just biomedical challenges, they are social ones, too. There’s increasing recognition that unless we grasp this, we’ll never make progress.”



Mainstream media and online forums frequently turn to the CHM team for expert opinion on the human and social aspects of the pandemic. Here, Professor Peckham shares his insights in *The Australian Financial Review*.

SHEDDING SOME LIGHT

A shortage of guide dogs in Hong Kong led two engineering students to develop an app for the visually impaired, which prioritises object identification, hazard detection and navigation.



Partnered with the Ebenezer School and Home for the Visually Impaired, the team had the opportunity to conduct user tests of the prototypes and thereby modify the features based on the feedback from the test users.

In 2018, two Computer Engineering students, Desmond Wong Chi-ping and Felix Wong Kwong-yat, were sifting through numerous ideas to submit for contention in the China Collegiate Computing Contest, when Felix read a news article about the severe shortage of guide dogs in Hong Kong.

"It got us thinking about alternate forms of navigational aid for the visually impaired," said Desmond. "Most of the existing aids, such as white canes, are technologically obsolete and unable to make use of the latest advancements in technology."

They decided to develop a machine learning-powered technological aid, and called it Lumino. The idea earned a second-class award in the contest, which was the validation they needed to continue developing the concept. They were joined at this point by a third team member Alvin Yu Shing-chit, an Arts and Law student at HKU, who took charge of the administrative and business development side of the business.

The Lumino app has two functions. The navigation function works by giving the user directions via haptic feedback through vibrations: the intensity of the vibrations increases when the algorithm detects that the user is straying off the correct path.

Surround cognition

The second function, surround cognition, is the app's selling point. "Lumino uses machine learning to identify the user's surrounding environment, and provides context-specific, latency-free obstacle and object recognition," said Felix. "When obstacles and objects are detected, we also offer user-friendly feedback that visually-impaired users find more intuitive – that is, auditory and haptic feedback."

Desmond elaborated on the details: "We have adopted a hybrid model: data unique to each user, such as their daily routines and idiosyncrasies, is stored locally on their device, while data beneficial to all users, such as those regarding typical structures and objects (walls, cars, keys) are stored in the cloud. Our self-developed algorithm processes the user's surrounding environment obtained from the live feed of their smartphone camera,

cross-references objects of interest from similar data stored in local and cloud storages, and produces suggestions for the user's reference, or completes tasks for them in the background.

"Visually-impaired people no longer have to scour their house for misplaced keys, nor worry about impending hazards just out of reach of their white canes: Lumino is able to anticipate their needs and provide context-contingent assistance, backed up by an extensive local and cloud database."

The students were given guidance throughout by Dr Vincent Tam, Principal Lecturer of the Department of Electrical and Electronic Engineering, and developed the project while doing his Embedded Systems course. Dr Tam said: "Most of the existing street navigation applications, like the Apple Maps or Google Maps, do not provide detailed guidance information for visually-impaired people – for example, 'in 300 metres, turn left' – especially important given Hong Kong's complex street layout and city design. The Lumino sensors are integrated into a very stylish prototype to guide the user via vibrations."

"Our vision for the hardware design was inspired by high-tech soundwear," said Desmond, "a wearable piece that sits round the shoulders like a small collar, with all the necessary sensors, actuators and machine learning-enabled computing module inside."

The project has received start-up funding. "We are in the 2020 cohort of the Science

and Technology Entrepreneur Programme (STEP) initiated by the Hong Kong Science and Technology Parks Corporations (HKSTP)," said Felix. "So far, we've made use of the training sessions that STEP offers to develop the non-R&D aspects of the start-up. The funding is currently being used to develop a prototype compact wearable device that accelerates the capabilities of the app."

User feedback

"Backed by HKU's Knowledge Exchange Office, we've had the opportunity to conduct user tests of our prototypes via our partnership with the Ebenezer School and Home for the Visually Impaired," he added. "The data we gathered from the tests was instrumental in calibrating our products, such as the sensitivity of the navigation algorithm. We've also listened to feedback from our test users and added features including facial recognition." Throughout the development of the Lumino project, Dr Tam has also helped and guided the team in several aspects: "I have offered technical advice and shared my past experience in project development and management through our regular meetings," he said. "I've also constantly reminded the team to seek input and feedback from the project's stakeholders: that is, visually-impaired people, especially those at the Ebenezer School who have given valuable advice."

He has further encouraged them, with the support of Computer Engineering Programme Director Professor Edmund Lam, to participate

in local and international competitions so as to "broaden their views and horizons" through exchanges with others. In addition to the China Collegiate Computing Contest, Lumino has won awards at the SG:Digital Wonderland 2019 (organised by the Infocomm Media Development Authority in Singapore), and at HKU's first Engineering InnoShow in 2019 where it received the Best Project Award from the course ELEC3442 Embedded Systems.

"Our current priority is tweaking our prototype and carrying out more user tests within the next few months," said Desmond. "Our next milestone is to graduate from STEP and be officially incubated in HKSTP – we're optimistic about Lumino's potential to reach new heights!"



DR VINCENT TAM

Most of the existing street navigation applications, like the Apple Maps or Google Maps, do not provide detailed guidance information for visually-impaired people... The Lumino sensors are integrated into a very stylish prototype to guide the user via vibrations.



Lumino was showcased at the SG:Digital Wonderland 2019, the largest tech exposition in Singapore. From left: Dr Wilton Fok, Jasmine Poon, Desmond Wong, Alvin Yu, Felix Wong and their supervisor Dr Vincent Tam.



The Lumino team received the Best Project Award for the ELEC3442 Embedded Systems course from the Dean of Engineering Professor Christopher Chao (left).

WORKING TO HIS HEART'S CONTENT

Mr Steve CK Lo derives his greatest pleasure from doing meaningful work. Now, after more than three decades in the private sector, he will apply his considerable passion and energy to his new position as HKU's Executive Vice-President (Administration and Finance).



Mr Steve CK Lo is proud to call himself a workaholic. Spending 18 hours a day, seven days a week, on his job is his idea of paradise. Which is surprising because he seems nothing like the obsessive, stressed-out stereotype that such a lifestyle brings to mind.

He has an informal, chatty manner that puts the listener at ease. The discussion is relaxed and unrushed. "Work is not a hardship, it's my entertainment," he insists. "I derive a lot of fun from working."

Enjoying life while working hard at it was instilled in Mr Lo from a young age. He is the eldest of four children in a family that had very little money, but a lot of grit. All four graduated from HKU, driven by their mother's mantra to study hard, work hard, be righteous and follow the rules, and find contentment with what they have, rather than being greedy for more.

From the moment he graduated from HKU in 1981 with a Bachelor of Social Sciences in management sciences (there was no Faculty of Business and Economics back then), Mr Lo was chomping at the bit to put these practices to work and get on with life. "My ambition at that time was to get out of university as quickly as possible and make a living as quickly as possible now that I had that ticket."

Strategies with a vision

He cashed in the ticket by joining the Jardine Matheson Group and rising through the ranks from management trainee to Chief Executive Officer of Jardine OneSolution Holdings (JOS). Over three decades, he transformed the

company from a traditional office equipment supplier with about 200 employees, to one of the largest IT systems and services providers in Asia with more than 3,000 staff in Hong Kong, Singapore, Malaysia and the Mainland.

The secret to his success was his dedication to work, coupled with an ambition to make a splash – one of his mottos is 'play to win', which evolved from his years as a keen sportsman. While still a trainee, he did deep research on office technology and spotted an opportunity that was in an embryonic stage and not yet on other people's radars: within the next decade, stand-alone copiers, typewriters and data processors were likely to be replaced by integrated information technologies. He proposed that the company pivot to this up-and-coming area, which the board agreed, and they made a huge jump on the competition.

"People said I had a vision, but what is a vision? I believe it is something supported by research and data on what the future could be like," he said.

Mr Lo also helped steer the company through the Asian financial crisis, dotcom bubble and SARS epidemic, so he knows a thing or two about dealing with change. It will stand him in good stead in his new position as HKU's Executive Vice-President (Administration and Finance).

Getting in synch

The University has big ambitions to ramp up its research and facilities and strengthen support for academic activities. Mr Lo's portfolio encompasses all financial and

administrative operations, ranging from human resources to IT services to estates to healthcare and safety. He is particularly keen on getting all these parts to operate more seamlessly as one.

"HKU, like Hong Kong as a whole, has a lot of legacy systems and practices. My job is to share my perspective from the commercial sector and build an enabling platform that will synchronise all these areas so they can work together in support of the University's research, teaching and service missions," he said.

Some change will be inevitable, but he hopes to 'ride Mother Nature' as much as possible, meaning he does not want to force change but to roll it out when the time is right. "I don't want to be too aggressive in setting hard-line goals, but rather focus on measuring progress made. I'm hoping that I can work with everyone and motivate them to make meaningful change without needing a change 'programme' *per se*," he said.

Mr Lo will have to ride a few changes of his own on returning to HKU. As a student, he was an affiliate of Ricci Hall and spent a lot of his time playing sports and hanging out in the 'snake hole', as he calls the hall, where he could let his hair down. Now, after being head-hunted, he has a comfortable office on the 10th floor of Knowles Building, a floor he never visited as a student. With the new position comes a new attitude.

"I'm actually more determined and committed than when I was in university. It is bewildering, I have come back a lot older, but with more ambition than when I left," he said.



MR STEVE CK LO

"I'm hoping that I can work with everyone and motivate them to make meaningful change without needing a change 'programme' per se."

A VALUES-DRIVEN APPROACH

Professor Samson Tse Shu-ki is HKU's new Dean of Student Affairs at a delicate time for the University following the social movement and ongoing COVID-19 pandemic. His message: let's treasure what we have and build from there.



Professor Samson Tse Shu-ki is Hong Kong-born and bred – his father was a truck driver, his mother a shopkeeper – but he spent 20 years in New Zealand, teaching in the field of psychiatric rehabilitation. Living far away, he yearned for contact from home, so he and his wife began opening their doors on Friday evenings to Asian students to share a meal and good company. That experience of getting to know students outside the classroom – of mixing with, supporting and coaching them – is an approach he hopes to bring to his new role as HKU's Dean of Student Affairs (DoSA).

Like his predecessor, Dr Eugenie Leung, Professor Tse has a background in mental health and cares deeply about students' well-being. Dr Leung is a clinical psychologist, while Professor Tse is a certified counsellor and accredited supervisor, and an accomplished scholar who has specialised in supporting people's recovery from mental illness and problem gambling. He was based in the Department of Social Work and Social Administration before taking up his new position.

As DoSA, he heads the Centre of Development and Resources for Students (CEDARS), which provides support to students in the areas that lie beyond formal teaching and learning, such as housing, career counselling, service activities, general education, special needs, and personal counselling.

These services have been disrupted by COVID-19, which came on the heels of the social movement in Hong Kong. Dr Leung had her hands full maintaining high-quality services and keeping lines of communication open in the midst of these crises. While the dust has not yet settled, Professor Tse is looking forward to navigating a new normality as people start returning to campus with the lifting of COVID-19 restrictions.

Gathering momentum

"I keep hearing my colleagues and students say how they now value and treasure the chance to be together and see each other on campus. Why did we not value that in the past? When we are able to resume that

normalcy, what will that mean to HKU? What does it look like?

"As an example, I would like to see an expression of the energy, vibrancy and joy of being back together on campus – I'd like to see cultural performances, exercise and debating, all those things, popping up again via different media. But I'd like it to be done in a collective, programmatic way with students and student societies, so it is not just a one-off bubble that then bursts.

"We already have good programmes, such as the Week of Welcome that integrates and welcomes local and non-local students to share a meal and do activities together. That is an excellent beginning, but I hope we can look at other mechanisms and opportunities to keep the momentum going."

He sees online engagement as one possibility. CEDARS recently ran some activities online, such as seminars on interview skills and the Global Meals Chat where students and alumni from around the world shared hometown dishes online. These not only had high

enrolments, but students stuck with them – the participation rate was high, too.

Character building

More importantly, Professor Tse has a vision for where his priorities will lie, called the '3Cs', for community, character and caring campus.

On community, he will focus on initiatives to build trust, welcome newcomers and develop community identity. On character, he wants students to flourish and to help them strengthen their values, resilience, friendship, integrity and the like (as Associate Dean of Undergraduate Education in the Faculty of Social Sciences, he spearheaded the Character of Leadership programme in collaboration with Oxford University over the past three years). And in terms of a caring campus, he wants HKU to be a place that looks after people of diverse backgrounds and provides all students with easy access to programmes and services for personal wellness and development and art and cultural experiences.

"My chief focus is on student wellness and personal growth," he added. "I am keen to talk with students from all walks of life, whether local or non-local, Mainland or overseas, affluent or struggling. I want HKU students to have fun, to have good friendships and to have a lot of interesting, life-enriching experiences while they are here."



**PROFESSOR
SAMSON TSE
SHU-KI**

"I keep hearing my colleagues and students say how they now value and treasure the chance to be together and see each other on campus. Why did we not value that in the past?"

PROTESTS SPONSORED BY THE STATE

Social movements used to be about disadvantaged groups rising against the state. But now, states themselves are initiating social movements. Political scientist Dr Yan Xiaojun has been investigating.

A new approach to ruling has emerged in recent decades that is shaking up the relationship between the state and society. Governments in diverse areas of the world have been mobilising citizens to execute and give legitimacy to their policy aims, in the guise of a 'social movement'.

"In the past, we thought of social movements as the weapon of the weak and of disadvantaged social groups who did not have much say in national policies and sometimes

went to the streets to fight for their rights and dignity. The target was always the state," said Dr Yan Xiaojun of the Department of Politics and Public Administration.

"But in the 21st century, we are realising this might be only half of the story. Social movements have also become a very important tool of governance, especially for authoritarian regimes but also democratic states. More and more, they use social movements to achieve their political goals, or to fight their real or imagined enemies. It's a global phenomenon."

The phenomenon began to take hold in the post-war era – in places such as Mississippi, where political leaders and white supremacists allied to maintain Jim Crow laws, and China, where Mao Zedong launched both the Red Guards and the workers' groups that subsequently contained them – and it has accelerated.

Recent examples include the mobilisation of Crimean citizens by Russian allies to oppose Ukrainian rule in 2014, Vladimir Putin's support for citizen campaigns to change Russia's constitution so his rule could be extended, Hugo Chávez's creation of citizens' groups to back his policy and political goals, and the Hong Kong government's support for new social groups to counter the Occupy Central movement and the recent protests.

"The study of state-sponsored social movements is surprisingly a new field in political science," said Dr Yan, who has just edited a new book on the topic, *Ruling by Other Means: State-Mobilised Movements*,

with colleagues from Harvard University. "But it's really become a global movement."

Pitting different groups against each other

Dr Yan's own chapter focusses on Mao's use of worker groups to suppress student-led movements in 1968 and 1989.

In the first case, the Red Guards founded by Mao in 1966 had descended into in-fighting and factionalism. To bring them under control, Mao formed Workers Propaganda Teams for Mao Zedong Thought, comprising factory workers who entered university campuses and put down the most violent Red Guard factions. The teams then uprooted higher education by taking charge of the universities and abolishing the merit-based education and promotion system for one based on political background. The workers' teams held sway until Mao's death in 1976.

"There is a famous saying by Mao: the proletariat will enter into the university, will study in the university and will control the university," Dr Yan said. "This was a success for Mao, but it may not have been to the country's benefit."

Students were also targeted in June 1989. Peasants in Beijing were mobilised on June 1–2, 1989 to launch a propaganda war against student protests that could justify a military crackdown. Shanghai followed a different path, mobilising factory workers to directly confront the students, a tactic that avoided bloodshed, although it was formulated after the violence in Beijing.

"The central theme of this book is that the state might not use direct state agents or forces to reach a particular policy goal, but instead mobilise one part of society against another," he said.

Learning from experience

How does the state gain complicity in social movements? During the Cultural Revolution, the cult of Mao made people keen to do his bidding. In 1989, peasants and workers who had benefited from Deng Xiaoping's reform policies were willing to defend the status quo.

In Putin's Russia, bribery and payoffs have been used to incentivise people. In Mississippi, existing social structures and groups were tapped for support. In Hong Kong, the government created new social groups specifically to counter the Occupy movement.

States can also sponsor social movements for various purposes – to suppress one group as in China, enforce racial segregation as in Mississippi, take over territories as in Russia or, more constructively, to mobilise support for physical development plans as seen in Taiwan.

"Governments around the world are learning from their experiences how to use state-mobilised social movements," Dr Yan said. Opponents are learning, too. He pointed to Hong Kong protestors, who disclose the connections of state-mobilised groups to the state, thus undermining their credibility.

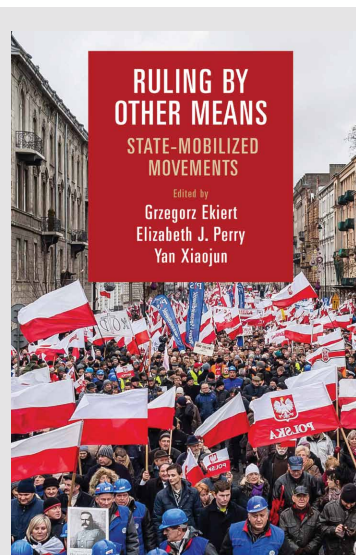
"The state in the 21st century is undergoing a transformation. The relationship between the state and society is changing and the boundaries are becoming blurred," he said. He cited the example of commercial entities conducting censorship in China

and managing prisons in the United States. "Prison, according to Max Weber, is a purely state action. But now we don't know which part is the state and which part is society."



DR YAN
XIAOJUN

“
The state in the 21st century is undergoing a transformation. The relationship between the state and society is changing and the boundaries are becoming blurred.
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Ruling by Other Means: State-Mobilised Movements

Editors: Grzegorz Ekiert, Elizabeth J Perry and Yan Xiaojun

Publisher: Cambridge University Press

Year of Publication: 2020



The Red Guards was founded by Mao in 1966 but later descended into in-fighting and factionalism. Mao therefore formed Workers Propaganda Teams for Mao Zedong Thought, which were sent to universities and factories, to bring the Red Guards under control and restore order.



The precious gift – a mango – given by Mao to the Workers Propaganda Teams for Mao Zedong Thought.

The University of Hong Kong Bulletin reports on activities, events and research initiated by members of the University. It aims to keep the local and international communities informed of new breakthroughs and achievements in all of our faculties and disciplines.

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