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BURSTING BUBBLES

The myths, realities and future of money

THE FIGHT AGAINST COVID-19

Finding new ways to contain the virus and protect people from infection

HOW TO CURE JAW PAIN

Investigating the relationship between facial asymmetry and jaw joint pain



CONTENTS

Cover Story

- 02 Bursting Bubbles
- 04 Crypto Meets the Real World
- 06 Social Relations and Money
- 08 Money and the State
- 10 Money, Markets and the Rise of Modern China
- 12 Material Values

Research

- 14 Fighting Back against COVID-19
- 18 Rapid Response
- 20 Sweet Deal for Songbirds
- 22 Something to Chew on
- 24 Diamonds Are a Tooth's Best Friend
- 26 The Public Knows Best
- 28 China's Jumpy Take on Tech
- 30 Men Win out in Divorce in China
- 32 All Systems Go
- 34 Evaporation Revelation

Teaching and Learning

- 36 The Common Core Turns 10!
- 38 Leaders of Tomorrow

Knowledge Exchange

- 40 Early Detection to Beat Liver Disease
- 42 Food for Thought

Books

- 44 Your Right to Technology
- 46 Identity Dramas




02

BURSTING BUBBLES

THE MYTHS, REALITIES AND FUTURE OF MONEY

HKU scholars look into our psychological and social relationships with money and money's role in the Russian Revolution and the emergence of modern China, while giving consideration to the contradictory promises of digital currency.



32

ALL SYSTEMS GO

14

FIGHTING BACK AGAINST COVID-19



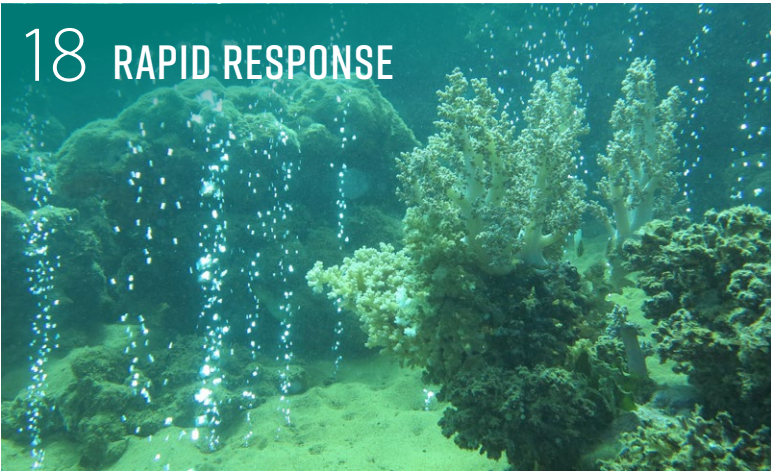


42

FOOD FOR THOUGHT

18

RAPID RESPONSE





22

SOMETHING TO CHEW ON

BURSTING BUBBLES

Money is shrouded in two myths – that it is a creation of markets, not the state, and that people use it in rational ways. HKU scholars have been poking holes in these ideas, focussing on our psychological and social relationships with money and money's role in the Russian Revolution and the emergence of modern China. At the same time, they are giving consideration to the contradictory promises of digital currency, which could both free us from government oversight and empower greater oversight.



CRYPTO MEETS THE REAL WORLD

Digital currencies promise contradictory things – from giving authorities the power to trace people’s spending to supporting a cyber economy that is free from government oversight. Dr Yang You’s research suggests that eluding the existing world order may be a pipe dream, but there is ample room for the cyber and the real to converge.

Fiat money, generally speaking, is money that is issued and backed by states who promise to uphold its value. But that has not stopped people from imagining a world where currencies are ‘denationalised’. About 50 years ago, when economist Friedrich Hayek speculated on this possibility, it was impossible to test out on a massive scale as the technology was not ready. Today, the advent of cryptocurrencies has changed all that.

Companies and individuals can now create their own online ‘tokens’ or currencies that can be used to make transactions as sufficient users recognise the value. This has given rise to utopian ideals of an economy that is independent, decentralised and run by its users.

Dr Yang You, Assistant Professor of the HKU Business School, has been studying different forms of cryptocurrencies, but he is not convinced they will change the world as proponents envision. “Technology can secure digital property rights, however, it cannot resolve everything. You still need to rely on a trusted party to provide information that connects the digital footnote to the real world, and you still need some centralised power or authority to enforce that,” he said.

Nonetheless, there are ways in which the crypto world is starting to change our ideas of money and how it is controlled.

A distinguishing feature of digital currency is that it can be programmed, which has attracted deep interest from central banks, he said. China, for

instance, is interested in the traceability function which would make it possible to understand household behaviour or business practices better. Governments could also program digital money to be spent only on specified items, such as programming COVID-19 relief funds to be spent only on food and other necessities.

“A key feature of conventional fiat money is that it is memory-less – you don’t know who owned it before or how they used it,” Dr You said. “Generally, there are a lot of possibilities to re-engineer fiat money now.”

Online demand

That would put a lot of information in government hands, but governments are not the only ones with the potential to develop digital currencies. There are signs of an emerging cyber economy where tokens that act like currencies could emerge from payment systems within platforms, such as the Steam gaming platform and YouTube. Viewers would use the tokens to enjoy activities online but have no physical product as such delivered. Big players like Facebook and Alibaba could also develop a currency for their users.

Dr You sees more development in this area as young people spend substantial time with their phones and engage with their friends on social media rather than offline hangouts. “The time spent online can potentially create a real demand – I don’t see that as a fake thing,” he said – though it is more likely these currencies would be confined to

use on specific platforms. His research has shown there are high issuance costs and pricing constraints to creating tokens that can be tradeable elsewhere.

Bitcoin and cryptocurrencies

Dr You also looks at digital currencies created beyond governments or companies. Bitcoin is the most famous example, but it is problematic because while it is created by ‘miners’ who supply the hardware and electricity to keep the network going, it is very slow and costly to use. “I think of Bitcoin kind of as a souvenir, beautiful but not very. The value comes from the limited supply, and the price only depends on consensus,” he said – unlike fiat currencies backed by governments, or even company-created tokens backed through the services they provide.

He sees more potential in the cryptocurrency Ethereum, which can embed contracts and other applications into its blockchain. These ‘smart contracts’ secure transactions digitally and require each party to set up a digital wallet through which the contract payment is executed automatically on the due date.

The hitch is that people are still needed to validate the conditions of the contract – in Ethereum’s case, miners are paid a ‘gas fee’ for their service, which is somewhat similar to a lawyer’s, but cheaper and less complicated. NFTs (non-fungible tokens) are another form of contracted



DR YANG YOU

They will merge, in a sense, because people spend so much time in the cyber world now and they care about their digital assets there.

digital currency which can track owners and, in the case of artworks, enable creators to earn a profit from their works.

However, smart contracts currently can only handle very basic transactions. “There are a lot of possibilities, but I don’t want to overstate how powerful these can be because the real world is much more complicated and sophisticated than anything that can be coded in these contracts,” he said.

As cryptocurrencies evolve, Dr You does not see them diverging from the real world. “They will merge, in a sense, because people spend so much time in the cyber world now and they care about their digital assets there,” he said. “The conventional money issuers, the governments, are trying to figure out what they can do to enhance their currencies, whether to recognise digital assets as real assets and how to collaborate with the cyber society.”

SOCIAL RELATIONS AND MONEY

Money is a form of exchange between humans. As such, it is used in ways that can be irrational, emotional and changeable. Dr Tom McDonald has been shining an anthropological lens on the nuances of our relationship to money.

About a decade ago, Dr Tom McDonald of the Department of Sociology was studying media use in rural China. But the deeper he got into his topic, the more he realised something bigger was afoot. Money exchanges on different kinds of social media were aligning with different kinds of social relations – WeChat for close friends and family, QQ for gaming and distant acquaintances, and Alipay for third parties and businesses. Workers were spending large amounts of their free time on social media to collect virtual money convertible to tiny amounts of real-world money.

“It became obvious that money in China was becoming social media and that you couldn’t study the media in China anymore without having an awareness of what money was and how media itself was increasingly becoming transactional,” he said.

So he set out to learn more about money from an anthropological perspective, a journey that led him to develop a Common Core course on the topic and research further into the role of money in society.

“Many economists believe that human beings are rational economic actors, that our use of money is primarily as a medium of exchange and that we act in self-interested ways. However, anthropologists look at the way people really use money out in society and it’s quite obvious that a lot of our monetary practices are deeply irrational,” he said.

Emotional need

Things like gambling and shopping sprees can be motivated by emotional need, social signalling or even just a feeling of satisfaction from the act of spending money.

Stock market bubbles are also led by emotion. “When money seems to have this capacity to generate more money, people fear they are missing out and they pile into the stock market, further increasing the value. But when confidence changes, they want to turn their capital into cold hard cash. Suddenly, you get a crash,” he said.

Contemporary understanding of money, debt and value is also changeable, he said.

For example, the modern idea of debt allows creditors to earn money by charging interest, while in the past debt was seen as a straightforward exchange of favours between people. Physical money has changeable forms, from the kula shells still used for exchange in parts of Papua New Guinea to the SMS money transfers that proliferate in Haiti, where most people do not have bank accounts or identity documents. The monetary value attached to objects is also not fixed, as seen most explicitly in art auctions where auctioneers use various techniques to push the price of artworks to their highest possible value.

All these issues are explored on the course with the aim of getting students to reflect on the role of money in their lives and in society, he said. Their output has included taking photos or videos that document the use of money in their communities, such as the monetary debt implied in filial obligations and the

social signalling behind the city’s obsession with luxury watches (the results are at <https://hkmoneymuseum.com/>). Students also compose essays in the form of letters outlining problems with money and future scenarios, such as writing to the World Bank about wiping out national debts and setting out the arguments on why children should receive pocket money.



DR TOM MCDONALD

In the end, it’s important that they realise money is created by human beings and that it has not always been the way it is now.

Crypto questions

Dr McDonald said the topic was timely for students, not only because they will soon be making decisions about careers to pursue and how to spend their earnings, but because new forms of money are taking hold.

“Students are fascinated by cryptocurrencies and NFTs [non-fungible tokens],” he said. “In the end, it’s important that they realise money is created by human beings and that it has not always been the way it is now. All these new technologies are re-drawing the possibilities of money and the relationships involved in money. For example, many cryptocurrencies cut out the traditional banking system and often the state. Is this desirable? Is this what we want?”

Apart from the Common Core course, Dr McDonald also recently completed a research project that highlights the human relations that remain pivotal to money exchange. Looking at cross-boundary transactions among people who travel regularly in the Greater Bay Area, he found they often rely on friends and family for cross-boundary money exchange, for example, by transferring Hong Kong dollars to a friend through one account and being repaid by the friend in RMB through a different account.

This is cheaper and avoids the bureaucracy of regular banking.

“Despite the promise of things like digital wallets and new virtual banks in Hong Kong, people often still fall back upon informal transactions,” he said.



Visit the Hong Kong Money Museum



MONEY AND THE STATE

What comes first, money or markets? Historian Dr Oscar Sanchez-Sibony’s investigation of the Soviet Union’s early years provides strong evidence that money comes first and that it is a creation of the state.

Money is different things to different people, none more so than economists and anthropologists. Economists often see money as an instrument that makes bartering in the market run smoother – it’s easier to trade dollars than lug around actual cows and bags of rice for exchange. But anthropologists and other social scientists increasingly argue that money precedes markets and in fact is created by states to create legitimacy and support their work.

Dr Oscar Sanchez-Sibony came across these arguments as he was delving into the economic history of the Soviet Union. He wanted to understand why, after taking power in 1917, the Bolsheviks signed their country up to the gold standard, to which major capitalist economies of the day had pegged their currencies to make them more interchangeable.

“The gold standard underpinned capitalism in the pre-World War One era and was an institution designed to protect financial interests and capital, so it seemed very surprising that anti-capitalist revolutionaries would join the gold standard. This was why I started to look into theories of money and how it works and gets created,” he said.

The theory that best fits the Soviet Union is that money is an instrument of the state to create social obligations that can be paid back in taxes. Money makes tax collection easier by obviating the need go to farms and take a share of produce to support state functions.

Rebuilding bonds

The Soviet Union was enlightening on this point because it did not have a stable currency until 1923 when they issued their own gold-backed rouble (chervonets) which, even then, did not take hold right away. For the first few years after 1917, the main forms of exchange were old imperial roubles and sacks of wheat – rather than moving actual sacks around, people recorded debts and payments in wheat-sack terms. Acceptance of the Soviet rouble became important not only for practical reasons, but also because it meant the Soviet government could collect resources from people through taxes to rebuild the state and establish social cohesion.

“The Bolsheviks were unpopular, especially in the countryside, and they were trying to create a new state after one of the most destructive civil wars ever, which was followed by famine. They were trying to rebuild bonds back up within society. Money is such a great instrument for doing that, among other things, because it creates markets,” he said.

The adoption of the gold standard also had a political aim of showing bankers, investors, and ‘capital’ in general that the Bolsheviks were good financial stewards whose money would not suddenly devalue. This was necessary



Red Globalization: The Political Economy of the Soviet Cold War from Stalin to Khrushchev (left) written by Dr Oscar Sanchez-Sibony and its recently translated Russian version (right).



The chervonets was the gold-linked paper money the Bolsheviks produced in order to build credibility with their citizens and foreign investors. The name denotes a certain conservatism, recalling the 15th-century Russian name for the Dutch ducat, which in time came to refer to different foreign gold currencies.

because the Soviets wanted to continue to export wheat and other commodities – collected from citizens even at gunpoint – to trade for industrial equipment and products.

But that aim hit a bumpy road when the gold standard started crumbling in the late 1920s. Countries were forced to devalue their currencies and they began to undercut each other, leading to disruptions to trade and ultimately, the Great Depression.

A small return

The Soviets responded by collectivising farming to increase their acquisition of grain, a problem all governments faced at that time. Initially, 15 per cent of farms were targeted, but farmers were reluctant to sell to the state at low prices. When Joseph Stalin consolidated his leadership in the late 1920s, he ramped things up violently to the extent that the entire countryside was collectivised and famine and death ensued. It was a high price to pay for a small return.

“It turned out that even as they seized this grain, they still weren’t able to export it for industrial inputs,” Dr Sanchez-Sibony said,



DR OSCAR SANCHEZ-SIBONY

If you take the view that money is just an instrumental thing with no meaning, then you miss understanding why they paid off their debts at such a huge cost.

because all countries were trying to increase exports. “The Bolsheviks did that more than anybody by continuing to lower prices even at great pain to citizens.”

The Soviet Union was also one of the few countries to pay off all its debts during the Great Depression and never declare bankruptcy (though it had defaulted on the Tsar’s debts in 1918), which Dr Sanchez-Sibony said was because the Bolsheviks still wanted international capital. “If you take the view that money is just an instrumental thing with no meaning, then you miss understanding why they paid off their debts at such a huge cost.”

Dr Sanchez-Sibony noted that the state-linked view of money continues to have relevance today because money continues to serve the state. For instance, after the 2008 financial crisis, US policy was to print money and save banks and the banks of its allies. Earlier, after the 1997 Asian financial crisis, many governments built up large reserves of US dollars to protect against future economic collapse. “Vladimir Putin learned the lesson well. To a large extent, he has been able to withstand a lot of pressure from the US precisely because of the large reserves Russia built after 1998 on the back of oil and gas,” he said.



Postcard showing the Shanghai Bund, early 20th century.
(Image courtesy of Ghassan Moazzin, private collection)

MONEY, MARKETS AND THE RISE OF MODERN CHINA

Many factors lay behind China's slowness to industrialise and gain control of its economy in the 19th and 20th centuries. But a key one was money: there was no unified currency and no capital markets in the country through which the government could raise money. Dr Ghassan Moazzin has been studying the situation, whose consequences reverberate today.

In the 18th century, the Qing dynasty was at its height: China was a global superpower and its coffers were full. By the end of the next century, all that had changed. While other major regions, in particular Europe and North America, were industrialising, China lagged well behind.

While there were many reasons for China's weakness, recent research suggests that the lack of a unified currency and capital markets made it difficult for the country to emerge from the quagmire, according to economic historian Dr Ghassan Moazzin of the Hong Kong Institute for the Humanities and Social Sciences and the Department of History, who has written a book on foreign banking and international finance in China from 1870 to 1919 that is about to be published this summer.

"The Chinese government before the 19th century did not really get involved in the Chinese economy all that much. Then they realised that the country had fallen behind and



Bond for a Chinese government loan, 1898.
(Image courtesy of Deutsche Bank AG, Historical Institute)

they needed to come in and help the economy somehow," he said. "If you want to do that, you want to have control of the currency. You also want to have your own capital markets at home where you can borrow money." China had neither of these things.

On money, two kinds of currency circulated in the 19th century – copper coins issued by the government and used for everyday transactions, and silver, which was used for expensive purchases and, importantly, to pay taxes. The silver currency was imported mostly from Spanish America and each region within China had its own system of measuring and calculating the value of silver.

"The government did not really have any control over the supply and circulation of silver in the economy and this led to important problems," Dr Moazzin said.

Affecting state development

In the early 19th century, different factors led to the appreciation of silver, which in turn had a negative impact on the economy. The government made various attempts to deal with the problem, but it did not succeed until after 1927 when the Nationalists gained control.

"They managed to do a quite successful currency reform in 1935 but then the Sino-Japanese War came. It was only after 1949 that the Chinese government managed to properly reform the currency," he said.

"When we think about how different generations of Chinese political leaders and



DR GHASSAN MOAZZIN

The government did not really have any control over the supply and circulation of silver in the economy and this led to important problems.

reformers tried to build a Chinese nation, the monetary question and how to develop a unified Chinese currency system that the state has control over is not something that comes up much. But recent research by financial historians indicates that there is a thread that you can draw from the mid-19th century all the way to the mid-20th century."

The lack of capital markets also affected state development. Unlike Western powers, China could not turn to markets at the outset of its industrial revolution to help fund railways, trading companies, large factories and other major ventures.

"For the Chinese state, it was just unthinkable that you would borrow money from your citizenry. If you had to do so, if your treasury was basically empty, it meant things were not going well," Dr Moazzin said.

Cautious about foreign banks

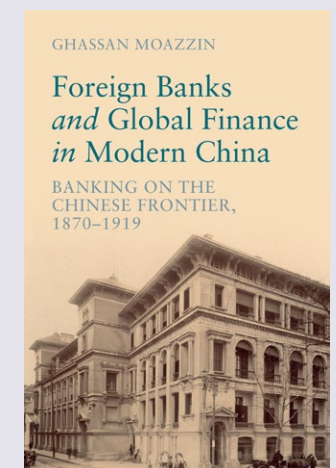
To get funds for industrialisation projects, the government had to look abroad. Foreigners were happy to finance Chinese bonds because the return was better than many European government bonds. Other developing countries experienced the same phenomenon. "China could quite easily borrow money abroad, maybe a bit too easily, and later defaulted on a lot of that money," he said.

Foreign banks, such as the Hong Kong and Shanghai Banking Corporation, helped connect the country to foreign markets and played an important role in the Chinese economy. They also issued their own banknotes, which further complicated the

currency problem (in Hong Kong, some of these banks still issue currency).

While the government made some attempts to establish homegrown capital markets to borrow from Chinese investors, these did not really work until the 1920s – at which time it became more difficult to borrow from abroad. Since 1949, China has again gradually developed its own capital markets, but has at times also raised capital abroad.


A possible legacy of all this is that China remains cautious about foreign banks and has restricted their activities in the country. "We can connect this to the experience of foreign banks being so powerful in the late 19th and early 20th centuries in China. After the 1980s, the government was quite cautious to make sure that doesn't happen again."




Foreign Banks and Global Finance in Modern China: Banking on the Chinese Frontier, 1870–1919 is forthcoming from Cambridge University Press.

MATERIAL VALUES

Our attitudes to money can influence our behaviour towards others and even impact our mental health, finds Professor Chen Zhansheng of the Department of Psychology.



The best things in life are free
But you can give them to the birds and bees
I need money (That's what I want)



These lyrics come from an old American pop tune that has been covered by the Beatles and many other popular bands. But that fondness for material over emotional desires also fascinates psychologists, including Professor Chen Zhansheng, who has been studying the way money shapes how we think, feel and behave, as well as exploring cross-cultural differences.

“There is a long literature on materialism, which basically studies people’s values and how they think about money. Do you think money is the most important thing in life? How do you place money versus other things, for example your relationships and maybe your contributions to society?” he said.

Common sense might suggest that ranking money, or materialism, highly will negatively influence how one relates to others. Professor Chen’s research has been providing the hard evidence of causal effects, ruling out other factors, and trying to explain why this might be.

For instance, he has found that those high in materialism, as measured in questionnaires and experiments, tend to treat other people

as instruments to facilitate goal achievement, such as networking for business connections. This makes them less able to empathise with others and follows on from other research that has found highly materialistic people can be more hostile and aggressive in the face of conflict.

Public health concern

Furthermore, people high in materialism also tend to unconsciously objectify themselves. “Such people are more likely to be very goal-oriented and spend a lot of effort and attention to sharpening their skills, staying motivated, and trying to create more wealth and gain more fame. In the meantime, they may lose touch or neglect qualities related to caring and compassion,” he said. “It may be that this will be problematic for public health. This is an area I want to pursue in future.”

He has already done related research showing the COVID-19 pandemic may be harder on highly materialistic people. The study, done in early 2020, was motivated by the fact people had to stay home and their chances to make money were diminished. “At that stage, people

with higher materialism tended to experience a high level of stress and anxiety,” he said.

Another finding is that people with high materialism can also experience a small but significant effect on their expression of emotions. In one experiment, he had people read an article about the pros or cons of a money mindset. Those reading about the pros were subsequently more reserved about expressing emotions. “This is an implicit process and they are probably not aware of it – they may still internally feel these emotions, but they don’t want to show their emotions to minimise any potential impact on goal attainment.”

Professor Chen noted high materialism is not always bad as it can make people more efficient at work and enable them to gain more financially. It also does not strongly correlate to generosity or helpful behaviours as people may donate or volunteer for reasons unrelated to materialism, such as tax write-offs or to gain a favourable opinion from others.



PROFESSOR CHEN ZHANSHENG

It shapes how you interact with others and also how you process information and treat yourself. It is not such a good thing to have this high materialistic value, especially for personal well-being.

“The relationship between materialism and helping behaviour is complicated, but the relationship with empathy is quite clear,” he said. “It shapes how you interact with others and also how you process information and treat yourself. It is not such a good thing to have this high materialistic value, especially for personal well-being.”

Cross-cultural comparisons

While materialism could be considered a personality trait, it can fluctuate or intensify depending on factors such as age and where

a person lives. Professor Chen has ongoing studies on cross-cultural differences that show residents of urban financial centres like Hong Kong or economic powerhouses like the US and China tend to be more materialistic than residents in quiet rural areas, such as a village in Thailand. But comparisons of the US and China show they are more alike than different.

“In terms of empathy and pro-social behaviours, we have found that the patterns are similar. There are bigger differences within a country or culture than between them,” he said.

He points to the example of China, where people have been found in surveys to be among the most materialistic on Earth yet are strongly willing to support those closest to them without recompense.

“People are very generous to their close kin – their kids, their parents and close relatives. It seems like they create a protective nutshell around them that is not so influenced by materialism. But when dealing with others outside these close bonds, then they become very materialistic,” he said.

FIGHTING BACK AGAINST COVID-19

Researchers at HKU have been finding new ways to contain the COVID-19 virus and protect people from infection. Professor Chen Honglin and Professor Chen Zhiwei in the Medical Faculty have developed a novel vaccine strategy using an injection and nasal spray that may offer better protection and prevention against asymptomatic transmission of the virus. And engineers led by Professor Mingxin Huang have developed a new stainless steel that is COVID-resistant and effectively kills the virus.

VACCINE BREAKTHROUGHS

Current vaccines for SARS-CoV-2 have done well protecting people from severe illness and death, but some studies have shown that even vaccinated people may continue to carry quite high levels of the virus in their nose, a situation that may underlie asymptomatic transmission and re-infection. In response, HKU researchers have developed new vaccines that can address that problem and are both cheap and easy to manufacture.

Professor Chen Honglin has drawn on his earlier work on a vaccine for influenza and coronaviruses to develop a nasal vaccine for COVID-19, while Professor Chen Zhiwei has adapted an HIV-AIDS vaccine he has been working on into an injectable COVID-19 vaccine. While work on their earlier vaccines is still going through the years-long process of pre-clinical and clinical trials, the urgency of COVID-19 has helped speed things up for the new vaccines and encouraged them to look at the effectiveness of combining the two.



The nasal spray vaccine manufactured by Wantai BioPharm is currently in the third phase of trials in the Philippines, South Africa, Columbia and Vietnam.

After multiple tests, they found that the injectable vaccine followed by a booster from the nasal vaccine could offer protection against the virus and reduce the viral load in the nose in animal trials. The findings were published late last year in *The Lancet's* online journal *EBioMedicine*.

"So far, this is the only vaccine combination able to block nasal infection and provide effective protection in both the upper and lower respiratory systems," Professor Chen Honglin said. The nasal vaccine also has potential as a booster for people who have received Pfizer-BioNTech or other mRNA-based vaccines.

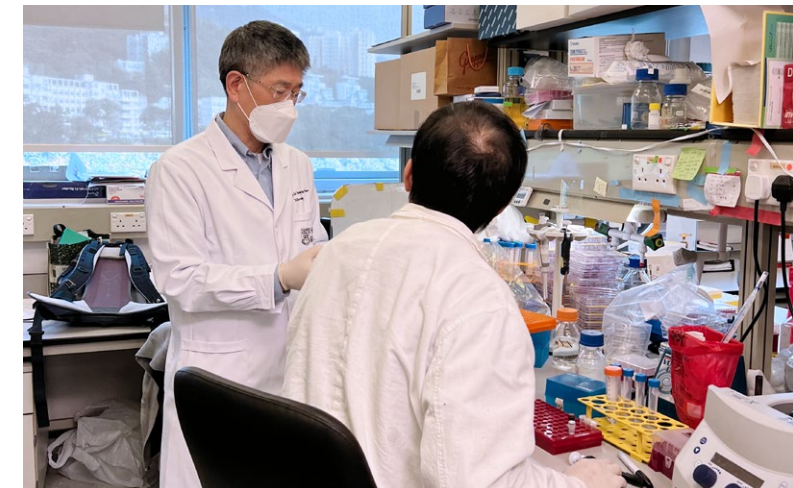
Building expertise

The origins of these vaccines date back two decades ago when, following the SARS outbreak in 2003, HKU began to build up expertise in infectious diseases. It is now a world leader in the field, hosting

among other things the State Key Laboratory of Emerging Infectious Diseases, which is led by Professor Chen Honglin and includes team member Professor Chen Zhiwei, who also is Director of the AIDS Institute at HKU.

Before 2020, Professor Chen Honglin had been working on a vaccine candidate that showed potential for protection against both influenza and coronaviruses, by knocking out the NS1 gene from the NS segment in an influenza virus and inserting a receptor-binding-domain of the MERS (Middle East Respiratory Syndrome) coronavirus in its place. He quickly managed to replicate and insert SARS-CoV-2, which is also a coronavirus, and showed that it offered good protection against the virus.

He also decided to focus on developing his findings into a nasal vaccine that provides 'frontline' protection where the virus can enter the body. Although a nasal form takes longer to develop than other vaccines, it is cheap and easy to deploy and has the potential to be a second-wave vaccine to boost immunity. There is also growing interest in this form of vaccine, as exemplified in an article in *The Washington*



Professor Chen Honglin (left) has drawn on his earlier work on a vaccine for influenza and coronaviruses to develop a nasal vaccine for COVID-19.

Post in April this year headlined, "The next leap in coronavirus vaccine development could be a nasal spray".

Professor Chen Zhiwei's new vaccine is built on the model he developed for an HIV-AIDS vaccine. This DNA-based vaccine has been going through the conventional vaccine testing and approval process since 2013 and has a special way of delivering the antigen to antigen-presenting cells that induces potent antiviral immunity.

For SARS-CoV-2, he swapped the HIV gene for the COVID-19 virus and has found that on its own, this vaccine can provide protection similar to that of mRNA vaccines while being cheaper and easier to manufacture. It can also be easily adapted to new variants.

Hurdles to development

The Lancet study reported on a variety of combinations using the two vaccines in animal models, with the best version being an injection



PROFESSOR CHEN HONGLIN

So far, this is the only vaccine combination able to block nasal infection and provide effective protection in both the upper and lower respiratory systems.

followed later by the nasal vaccine. However, they still must complete safety tests individually before they can be tested together in humans.

The nasal vaccine is being developed with Wantai BioPharm, a Chinese pharmaceutical company, and is currently undergoing phase two and three clinical trials in the Philippines, South Africa, Columbia and Vietnam. The DNA-based vaccine has just finished a phase one trial that confirmed it is safe in humans. It is being developed in partnership with Immuno Cure Biotech Ltd in Hong Kong, which has worked with companies in the Mainland that have GMP [Good Manufacturing Practice] facilities for pre-clinical and clinical testing.

Both professors said the lack of GMP manufacturing in Hong Kong had slowed down their vaccines' development because they had to look elsewhere for partners and testing facilities. Professor Chen Zhiwei hopes the government will reconsider its investment in this area,



Developed in partnership with Immuno Cure Biotech Ltd in Hong Kong, the DNA-based vaccine has just finished a phase one trial that confirmed it is safe in humans.



Professor Chen Zhiwei's new injectable COVID-19 vaccine is built on the model he developed for an HIV-AIDS vaccine.



PROFESSOR CHEN ZHIWEI

The wait time from bench to human trial has been very long because of the disconnection in the middle and the lack of manufacturing capacity. I hope this situation can be changed.

especially as other viruses are likely to threaten in future. When the first COVID-19 vaccines appeared, the government had to turn to sources outside the city in competition with other governments.

“We have the talent and expertise here with the State Key Laboratory and many scientists working on all kinds of viral diseases. Even when we can design a vaccine, the wait time from bench to human trial has been very long because of the disconnection in the middle and the lack of manufacturing capacity. I hope this situation can be changed so we can be prepared for future pandemics,” he said.

STEELING A MARCH

As COVID-19 continues to maintain its hold on Hong Kong, the development of a virus resistant stainless steel whose surface kills SARS-CoV-2 has big implications for use on frequently-touched areas such as lift buttons, door handles and handrails. *E. coli* and the H1N1 virus can also be inactivated on the surface of this special stainless steel.

The research, which was published in *Chemical Engineering Journal*, is a cross-disciplinary project led by Professor Mingxin Huang in the Faculty of Engineering's Department of Mechanical Engineering, in collaboration with Professor Leo Lit Man Poon's research team at the School of Public Health, HKUMed. Their work in this area began four years ago, before COVID had emerged.

“We started studying antibacterial and anti-H1N1 stainless steel and successfully invented antibacterial stainless steel containing silver (Ag) in 2019,” said Professor Huang. “When the COVID-19 pandemic began in early 2020, we changed our focus to anti-COVID-19 stainless steel. At the beginning, we thought we would be able to use our antibacterial steel for anti-COVID-19 purposes. But it failed, so then we invented our new anti-COVID-19 stainless steel that contains 20 per cent copper (Cu). The virus is killed by the Cu ions released from the steel surface.”



Sample of the anti-COVID-19 stainless steel that can kill the severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2) on its surface.

Tuning stainless steel

The team achieved inactivation of pathogen microbes (especially the SARS-CoV-2) on the stainless steel surface by tuning the chemical composition and microstructure of regular stainless steel. The research also found interesting points about Ag and Cu as the alloying elements to prepare anti-pathogen stainless steel, namely that stainless steel containing Ag is good at killing bacteria, but cannot inactivate the virus, while stainless steel with a high Cu content (10 per cent or above) can effectively kill bacteria and virus.

Ordinary stainless steel has no inherent antimicrobial properties and studies have shown that the SARS-CoV-2 can remain stable and viable for as many as three days. Since crucial public areas such as hospitals and kitchens have myriad stainless steel surfaces, they also have a high possibility for virus transmission among people.

Said Professor Poon: “Recent data suggests that Omicron is more stable than the original SARS-CoV-2 on different environmental surfaces. This suggests that Omicron has an increased likelihood to be transmitted by fomite (*i.e.* objects or materials likely to carry infection, such as clothes, surfaces, utensils and furniture). The stainless steel developed by us can reduce such risk.”

Existing surfaces cannot be adapted to the new technology and would need to be replaced with the tuned stainless steel. Already there has been a lot of interest from the industry.

“Many local Hong Kong, Mainland, international companies have contacted HKU for potential use of our anti-COVID-19 steel,” said Professor Huang. “HKU Technology Transfer Office is talking to several companies regarding potential licensing and costs. If the negotiations go well, we may be able to see real products in the near future.

“The team has produced prototypes, including lift buttons made from the anti-COVID-19 stainless steel using mature powder metallurgy technologies. Its successful fabrication indicates a promising prospect for the production of future anti-COVID-19 stainless steel products.”

Existing technology

It is also viable in terms of production technology. “The stainless steel can be tuned using existing powder metallurgy technology, so it is quite ready for mass production,” Professor Huang continued.

Said Mr Litao Liu, the first author of the journal article and a PhD student supervised by Professor Huang: “Massive Cu-rich precipitates are permanently present in the stainless steel matrix. Thus, this anti-COVID-19 stainless steel can chronically inactivate pathogen microbes even though its surface is continuously damaged, meaning that even if the surface is scratched or dented, the inactivation of the virus microbes will continue.”

Summing up, Professor Huang said: “This anti-COVID-19 stainless steel can replace some of the frequently-touched stainless steel products in public areas to reduce the risk of accidental infection and help fight the COVID-19 pandemic. In addition, the findings on Ag and Cu as the alloying elements to obtain antiviral and antibacterial properties have provided useful information for the future development of other forms of anti-pathogen stainless steel.”



PROFESSOR MINGXIN HUANG

The team has produced prototypes, including lift buttons made from the anti-COVID-19 stainless steel using mature powder metallurgy technologies. Its successful fabrication indicates a promising prospect for the production of future anti-COVID-19 stainless steel products.

Rapid Response

A study has shown that fish species which have evolved more rapidly in the past are equipped with better means to cope with increased ocean acidification across the globe.

Increased ocean acidification (OA) in recent decades means that pH levels in the global oceans are predicted to decline to levels which may affect some marine fish. Knowing how it will affect growth, behaviour and even survival of various types of fish is essential to working out how to optimise their conservation and management.

Dr Celia Schunter at HKU's School of Biological Sciences and the Swire Institute of Marine Science, led the study, working with teams of researchers from Japan, Australia and New Caledonia in the natural laboratories of Papua New Guinea.

"The most important discovery we made," said Dr Schunter, "is that the difference in evolutionary rate (over millions of years) provides the fish which evolved more rapidly with the flexibility to acclimatise. They can rapidly adjust the expression in a larger number of genes, which provides certain species with an ability to respond to the environmental changes such as elevated $p\text{CO}_2$ [partial pressure of carbon dioxide]."

The team carried out their research in Papua New Guinea's Upa-Upasina seep. "Volcanic CO_2 seeps in Papua New Guinea can be used as natural laboratories, where CO_2 rises from the substratum and acidifies the surrounding seawater to levels similar to, or sometimes beyond, the projections for OA by the end of this century," said Dr Schunter. "Despite these 'future' conditions, many species still



DR CELIA SCHUNTER

*The storm brought many difficulties for sampling and complicated the field work. But, at the same time, it also provided us with key evidence of the flexibility of the spiny damselfish species *A. polyacanthus* to adjust to pH changes.*

live in these seeps and studying them can allow us a peek into future ecosystems.

"While previous studies investigated the molecular response to elevated $p\text{CO}_2$ in different species, these investigations were performed in controlled aquarium systems. This study is the first of its kind to compare across species in a natural setting."

Storm sparks discovery

Nature also provided their work with another boost when a heavy storm rapidly changed the pH levels in the seep. "The storm brought many difficulties for sampling and complicated the field work," said Dr Schunter. "But, at the same time, it also provided us with key evidence of the flexibility of the spiny damselfish species *A. polyacanthus* to adjust to pH changes."

In particular, *A. polyacanthus* lacks a larval dispersal phase, which leaves this species with a more pressing need to adapt to local conditions than species with a dispersive larval phase. "We see this as the species has many positively selected genes across its genome, which means that selective processes are at play to adjust its genome to better live in local environmental conditions," said Dr Schunter.

"Maintaining pH and ion transport homeostasis are key challenges for fishes when coping with elevated $p\text{CO}_2$. This fish can adjust the expression of core circadian rhythm genes, which regulate the expression of the downstream gene related to intracellular pH regulation and ion transport."



A. polyacanthus may possess evolved molecular toolkits to cope with future ocean acidification.

Circadian rhythms are near-24-hour oscillations found in nearly all aspects of physiological processes in the vertebrate brain and body. The circadian clock also runs our daily lives and adjusts our metabolism to the time. Dr Schunter explained that you know the circadian rhythm is at play when you get tired in the evening or get hungry around the same time each day.

In short, she said, *A. polyacanthus* has developed a molecular toolkit, which will enable it to cope better with pH variations. "Previously we didn't understand why some species struggle with OA more than others. This time we saw that *A. polyacanthus* can regulate the pH levels within its cells through the gene expression changes in response to the environmental elevated $p\text{CO}_2$ at the CO_2 seep. We originally thought that an elevation in the $p\text{CO}_2$ to end-of-century predictions would not be a large impact to fishes, as they know how to regulate the pH, however we see that these coral fish species induced significant expression changes in many genes. This underlines the need to regulate the cells in the brain in response to the CO_2 levels in the ocean waters.

Reversible changes

The arrival of the storm, which lasted 24 hours at the remote reef, moved a lot of water of the CO_2 seep site and increased the pH temporarily. "We were able to collect some spiny damselfish during this time and now see that all the cellular changes are reversible as they changed quickly back to the levels of what we see at the control reef with current-day CO_2 levels."

However, although this particular species has coping mechanisms there is still cause for alarm at the pace of OA. Rapid environmental changes – caused by humans – are a threat for fishes, especially for slowly evolving fish species, said Dr Schunter. "Even for *A. polyacanthus*, it can be a problem if the environment changes faster than its ability to regulate the cellular activities. As such, it's important for us humans to slow down the activities which accelerate the environmental changes."

The research continues with further studies underway. "These include other fish species from different ecosystems (but also from CO_2 seeps) to understand the general applicability of our findings across all marine ecosystems (not just coral reefs)," she said. "Furthermore, as the circadian rhythm clearly plays an important role in the adjustment to changes in pH in fishes, we will investigate further the mechanisms and adaptive potential underlying this."

Sweet deal for songbirds



*A New Holland honeyeater (Phylidonyris novaehollandiae) perched on a banksia in Western Australia.
(Image courtesy of Gerald Allen, Macaulay Library)*

Scientists have discovered that songbirds evolved the ability to taste sweetness and believe that this has far-reaching implications for their subsequent evolution and radiation.

We are all familiar with the ubiquitous image of a hummingbird hovering in front of a flower as it drinks the nectar but scientists only proved they could in fact taste sweet in 2014. Now a new study has shown that songbirds are also able to distinguish sweet tastes but they evolved this ability in different ways to the hummingbird.

Many carnivorous animals do not have the ability to taste sweetness, and it was previously unclear if birds – which are descendants of meat-eating dinosaurs – could or not,” said Dr Simon Sin Yung-wa, Assistant Professor in the School of Biological Sciences and a member of the international team that did the research.

Cues for survival

It was important to find out because sensory systems evolve and adapt to allow animals to perceive cues important for survival. “The evolution of sensory receptors can affect the behaviours of a species and have profound ecological consequences,” said Dr Sin. “This may ultimately lead to speciation and adaptation radiation.”

“Birds are the most diversified terrestrial vertebrates, widely distributed on this planet and occupying different ecological niches,” he said. “The common ancestor of all birds, carnivorous dinosaurs, lost a subunit of the sweet taste receptor and hence the ability to taste sugar. However, we observed that many birds do eat sweet foods like nectar.”

They did know that some songbirds, like the sunbirds, consume a lot of nectar, but wanted to find out if all of them could taste sugar, and if so when this ability evolved. “The evolution of a new taste sense could have a big implication in the evolution and radiation in this group of birds, which includes almost half of the extant bird species,” said Dr Sin.

Twelve species of songbird were tested, including the warbling white-eye (*Zosterops japonicus*) which is a resident in Hong Kong and the carrion crow (*Corvus corone*) which, according to Dr Sin “was seen in Hong Kong but it’s only a vagrant”.

The leader of the research team, evolutionary biologist Dr Maude Baldwin from the Max Planck Institute for Ornithology, was the researcher who elucidated the evolution and mechanism of sweet perception in hummingbirds. Dr Sin was in the same laboratory as Dr Baldwin while they were at Harvard and he joined her in studying the evolution of taste perception in the songbirds.

“In hummingbirds, the umami receptor, which detects amino acids and is responsible for the savoury taste, evolved to become a sugar receptor,” said Dr Sin. “We found that songbirds are also able to taste sugar but we didn’t know how they are able to do that. Did their umami receptor also transform into a sweet receptor? If so, were the same or different mutations involved? Therefore, in this study we investigated the genetic basis and mechanism of sweet perception in the songbird to understand how different lineages of birds convergently evolved the same sensory ability.”



*A New Holland honeyeater (Phylidonyris novaehollandiae) feeding on Wilson's grevillea (Grevillea wilsonii), a favourite honeyeater food endemic to Western Australia.
(Image courtesy of Gerald Allen, Macaulay Library)*



DR SIMON SIN YUNG-WA

Distant bird groups converged on the same solution of re-purposing their umami taste receptors to sense sugar over evolutionary time. However, each group modified the receptors in distinct ways to achieve the same outcome.

Generating chimera

Their methodology for identifying modifications to the umami taste receptor involved “a lot of experiments to generate chimera (for example between ancestral and current umami receptors) or introduce mutations to the receptors, and then test whether those receptors could be activated by sugar,” he explained. “By changing the composition of the umami receptors in this way we were able to identify the positions that are crucial for the transformation of the umami receptor to a sweet receptor.”

They found that although both hummingbirds and songbirds re-gained their sweet perception through mutations in the umami receptor, the changes in songbirds and hummingbirds coincide only slightly, even though similar areas of the receptor were modified. “These distant bird groups converged on the same solution of re-purposing their umami taste receptors to sense sugar over evolutionary time,” said Dr Sin. “However, each group modified the receptors in distinct ways to achieve the same outcome.”

The team was able to discover when this ability evolved by reconstructing the ancestral umami receptors at different locations on the songbird family tree, using the information of the umami receptors in extant species to test the receptor activity towards sugar. “It turns out that the early ancestors of songbirds evolved the ability to taste sugar, even before they radiated out of Australia [where most songbirds originated] and spread across the planet,” said Dr Sin. “We were very surprised by this result. While, in Australia, many different sugar sources are common, including insect secretions and tree sap, sugary food sources may have also helped songbirds spread to other continents and successfully occupy a variety of ecological niches.”

SOMETHING TO CHEW ON

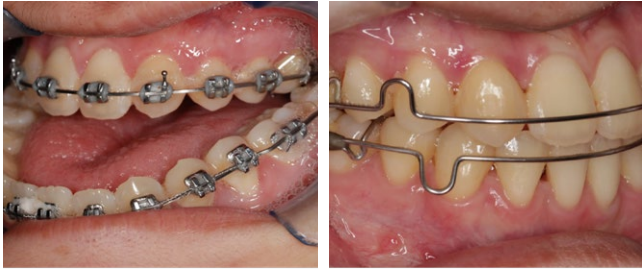
People with asymmetric jaws can have difficulties eating and talking. Research by Dr Mike Leung Yiu-yan in the Faculty of Dentistry confirms they are also at higher risk of jaw pain and shows that there is a solution.

Patients with asymmetrical jaws, where the left and right sides are of unequal lengths due to differing growth rates or trauma, have a lot to deal with. They have functional problems with eating and speaking and low self-esteem due to the impact on their appearance. Dr Mike Leung Yiu-yan, Clinical Associate Professor of Dentistry who runs the largest centre in Hong Kong for orthognathic, or jaw correction, surgery, noticed something else: they can also be in pain.

In a study involving 134 patients with jaw joint pain, or TMD (for temporomandibular disorder), he compared patients with and without facial asymmetry. TMD was significantly more prevalent among those with asymmetry.

“In the normal population, some studies have shown less than 10 per cent of the population is affected by jaw pain. But with asymmetry, we found two-thirds were affected. This makes me think that the asymmetry is causing the pain because of imbalances in the musculature due to the bite force,” he said.

“The next step was to see whether orthognathic surgery that corrects the asymmetry could lead to an improvement in pain.”



(Left) Photo of a patient with an asymmetric face and a severe reversed bite, that affected her eating function and caused jaw joint pain. (Right) Photo of the same patient after surgery to correct the large reverse bite.



Dr Leung and his team drew on their experience with 3D modelling and 3D printing to come up with a solution that not only reduces pain in patients with asymmetry, but also provides more reliably accurate jaw correction.

A 3D view

The traditional approach to jaw surgery involves using stone models of a patient’s jaw, manipulating the model into the correct position and creating an acrylic wafer of that to guide surgeons. The surgeons then cut the jawbone accordingly, move it into place and fix it with titanium plates. But the outcome can be subject to errors.

“It’s a bit tricky,” he said. “There may be errors when we transfer the model to the surgery, or errors in the lab work or in the measurements. And some people have faces so asymmetrical to start with that we only see the teeth and may not appreciate the whole problem.”

Instead, Dr Leung and his team worked with a CT scan, which gives a three-dimensional view, to simulate movement and design the titanium plates. With the help of an industry collaborator, the scan results were turned into 3D-printed plates that are to the exact specifications of the patient’s anatomy, which negates the need for the guiding wafer. Although some private companies do both 3D scans and printing, the surgeons in this case have better control over the

whole process and obtain the titanium plates in a shorter timeframe (private firms can take a few months).

“We’ve analysed the results of our approach and it’s proved to be very accurate,” he said. “With open-source programs, this will one day be a very popular approach and it will also reduce the cost and offer safer treatment.”

Regaining normal function

Most importantly, it reduces jaw pain. In a follow-up study, the prevalence of TMD in patients with facial asymmetry fell by 58.3 per cent six months after surgery. Patients typically leave hospital within two days and their jawbone heals within six weeks.

“The surgical correction of facial asymmetry allows a normalised chewing function and a corrected bite, and now we prove it also helps in treating TMD. Many people misunderstand that orthognathic surgery is for aesthetic reasons. In fact, the correction is to improve the sufferer’s function as well as reduce pain symptoms,” Dr Leung said.

Most of his patients are in their teens or 20s (some are older, mainly those who suffer from obstructive sleep apnoea due to a short jaw), and the impact on them goes well beyond physical symptoms.



DR MIKE LEUNG YIU-YAN

The patients start to feel so much more confident afterwards. They start to put on make-up, they stand up straight walking into my clinic, they speak to me totally differently.

“The patients start to feel so much more confident afterwards. They start to put on make-up, they stand up straight walking into my clinic, they speak to me totally differently,” he said, and their parents often remark that their child looks as they did when they were 12 years old – before growth spurts deformed their jaw.

“I tell my trainees that what is important is to always try to meet the expectations of patients, and I tell patients honestly what I can and can’t do so they do not have false hope. No one has perfect symmetry and some people’s faces are like a banana – no matter how you cut it, you can’t find a mirror image. But we can make it more symmetrical than it was,” he said.

DIAMONDS ARE A TOOTH'S BEST FRIEND

Nanodiamonds could be key to finding an alternative to the usual antibiotics strategy for battling oral infections.

A cross-disciplinary team has discovered that nanodiamonds (NDs) may be a highly effective agent in battling oral infections, a discovery which could open up new opportunities for improving oral health worldwide and provide a real alternative to the customary antibiotics route.

Dental caries effect approximately half the world's population – about 3 billion people – and can lead to a variety of other problems including Alzheimer's, obesity and cardiovascular diseases, as well as having far-reaching financial implications.

The path to discovery began when Dr Chu Zhiqin, Assistant Professor of the Department of Electrical and Electronic Engineering and Dr Prasanna Neelakantan, Clinical Assistant Professor in Endodontology, began discussing

the possibilities for NDs and joined forces to be co-principal investigators in the study.

"We had noticed that a lot of work had been done using NDs in cell suspensions, but surprisingly, we couldn't find any trail in biofilms," said Dr Chu. "As Dr Neelakantan is an expert working in this direction, we decided to give it a try and see what's going on there."

Dental caries is caused by a dominance of acid-producing bacteria – particularly *Streptococcus mutans* – that form biofilms on the surface of the teeth, while periodontal disease, commonly known as gum disease, is induced by *Porphyromonas gingivalis*, a Gram-negative bacterium. "Microbes demonstrate high resistance to conventional antibiotics, and there has been little significant development in therapeutic drugs for fighting fungal infections, another major infection

affecting human beings. In fact, patients with COVID-19 have been shown to have an increased prevalence of fungal infections," said Dr Neelakantan.

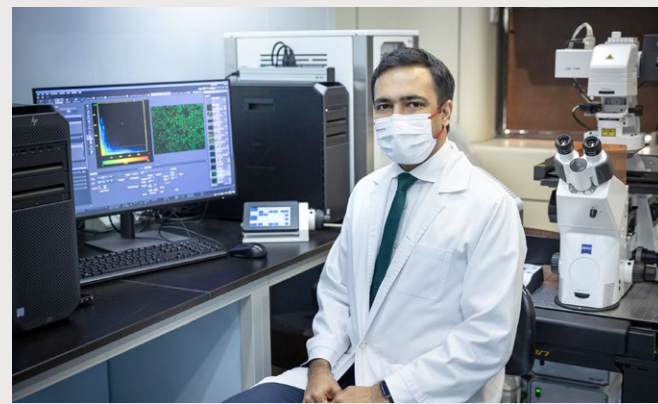
Battling biofilms

The team's work using high-pressure high-temperature NDs to inhibit the formation of oral pathogenic biofilms, may change all that. The research, which has been published in *Biomaterials Science*, shows that the NDs are effective against both the free-floating cells (planktonic cells) and the attached cells (biofilm) of bacteria and fungi that frequently cause oral and systemic infections, and that they can also disrupt preformed biofilms in certain orally and systemically important organisms.

"Our study provided the first laboratory evidence that a simple coating of



Co-principal investigators of the study – Dr Prasanna Neelakantan (left) and Dr Chu Zhiqin (right).



This study provided the first laboratory evidence that a simple coating of nanodiamonds can inhibit the formation of attached communities of bacteria and fungi.



This image depicts the biofilm inhibition in oral pathogens by nanodiamonds: bacteria can't stick to the substrate covered with nanodiamonds, and biofilm only forms in the substrate without any nanodiamonds.



DR PRASANNA NEELAKANTAN

Most pathogens are resistant to almost all antibiotics. So, in terms of impact for biomedical applications, this is significant because we are introducing an inexpensive, simple, non-antibiotic strategy.

nanodiamonds can inhibit the formation of attached communities of bacteria and fungi. These attached communities are called biofilms and it is shocking to know that at least 70 to 80 per cent of human infections are caused by biofilms," said Dr Neelakantan. "Most pathogens are resistant to almost all antibiotics. So, in terms of impact for biomedical applications, this is significant because we are introducing an inexpensive, simple, non-antibiotic strategy."

Synthesising NDs using high-pressure high-temperature methods is one of the leading approaches for fabricating NDs on a large scale. "In general, the resulting nanomaterials have a lot of unique features which are missing in their bulk counterpart," said Dr Chu. "We attributed the effects of NDs to their hardness, irregular shapes, faceted surfaces, etc, all of which lead to the destructive results in biofilms."

According to Dr Neelakantan, the team's next aim is to "develop a cost-effective, multifunctional coating on both natural (for example, teeth) and artificial dental substrates (for example dentures or implants, both of which often fail due to infections, especially in the elderly population)."

Preventative measure

The implications are that NDs could be used globally as a preventative measure against caries. "We envision a coating that can simply be placed on teeth or on prosthesis including dental fillings," he continued. "Currently, dental fillings fail because bacteria grow on them and in-between the filling and the tooth. Because of this, the average life of these fillings is currently not more than five years and this represents a huge financial burden for patients."

"Similarly, we would expect to investigate the effects of NDs as an anti-pathogen coating or spray in different environments. This is particularly important for tackling the current challenge of the pandemic."

As far as costs go, NDs are a viable proposition. "NDs are very cheap (approximately USD10 per gram), and this is one of the most attractive features for practical applications," said Dr Chu.

Asked where does the research go from here, Dr Chu said: "Our next step is to carry out a systematic study of how the properties of NDs, including their surface chemistry, shapes and other parameters may affect the interaction with biofilms."

THE PUBLIC KNOWS BEST

Determining the influence of broad government policy over the economy has been an elusive pursuit. But Dr Yang Liu has found a workaround. By combining public approval ratings of the US President and Congress with think tank assessments, he has shown how evaluations of today's policies correlate with future economic impacts.

Measuring the economic impacts of specific government policies, such as a new tax, is pretty straightforward: find the right variables and track them before, during and after the policy is announced. But trying to demonstrate a connection between overall government policy, economic growth and financial markets has been a far greater challenge because of the enormous number of variables involved. Dr Yang Liu of the HKU Business School and his colleagues have hit on a formula that may overcome that challenge and show how policy affects the overall economy and stock market, as well as exchange rates.

They looked at monthly public approval ratings of the US President and Congress from 1971 to 2019 and combined this with think tank assessments of government policies and the subsequent performance of the economy and stock market. They found that when approval was high, future growth rates of productivity, total output, consumption, investment, exports and imports, and government expenditures all increased over the following years.

"In other words, high approval ratings predict a persistent increase in future economic activity and an expansion in public outlays on intangible determinants of productivity and growth," Dr Liu said. They also lead to a reduction in economic uncertainty and volatility.

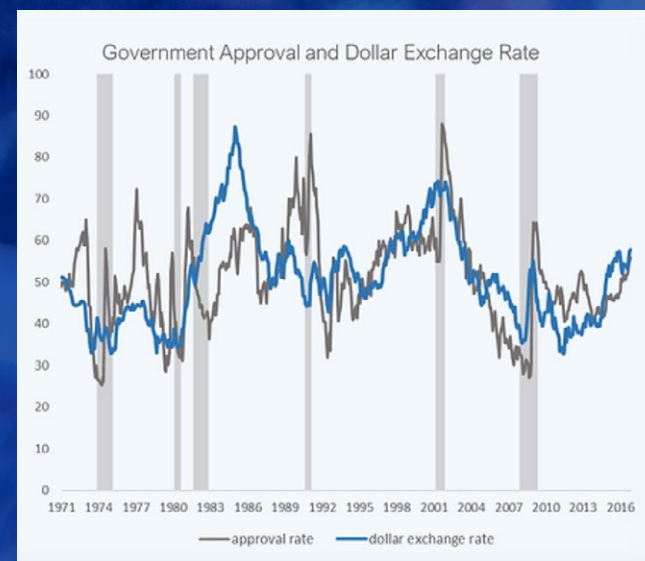
These effects are not likely driven by sentiment such as confidence because while this can affect financial markets, it has less impact on the economy. Even when events of high emotion are factored in, such as 9/11 and Watergate, the results still hold.

"When we remove these single events, the results get even stronger, which means we are capturing the general, slow-moving idea of

how people rate the government," he said. The results are consistent whether during a Republican or Democratic presidency.

Investor responses

The measurement also translates to the stock market where higher approval ratings are correlated with stronger stock market valuations and a stronger bond market.



Measures of US government policy approval are strongly related to persistent fluctuations in the dollar exchange rates. High approval ratings further forecast a decline in the dollar risk premium, a persistent increase in economic growth, and a reduction in future economic volatility.



DR YANG LIU

High approval ratings predict a persistent increase in future economic activity and an expansion in public outlays on intangible determinants of productivity and growth.

The scholars applied their method to another elusive question, that of exchange rates which did not appear to correlate with GDP, inflation, unemployment or other economic factors. The results showed exchange rates can be predicted based on government policy approval, which Dr Liu attributes to lower risk and uncertainty about the future.

"If I'm an investor and I am confident in the US policy and currency market, I will invest there without asking for a higher return. By comparison, if I want to invest in the Russian rouble, which is super volatile, I expect the rouble to appreciate in a big way in order to take that risk," he said.

Dr Liu said their approach was useful in evaluating the impacts of policies that are otherwise difficult to measure, such as those on trade, labour and antitrust. It could also apply to some extent to other countries. While most places do not have the rich public survey data of the US, comparisons of think tank evaluations of other countries show a similar connection between high policy ratings and future economic performance.

Debt worries

Dr Liu also did a case study of the State of the Union Address, which is delivered each year by the US President, to show the impact of policy. On the day of the address, the stock market tends to increase about 0.3 per cent, or 30 basis points – compared with other days

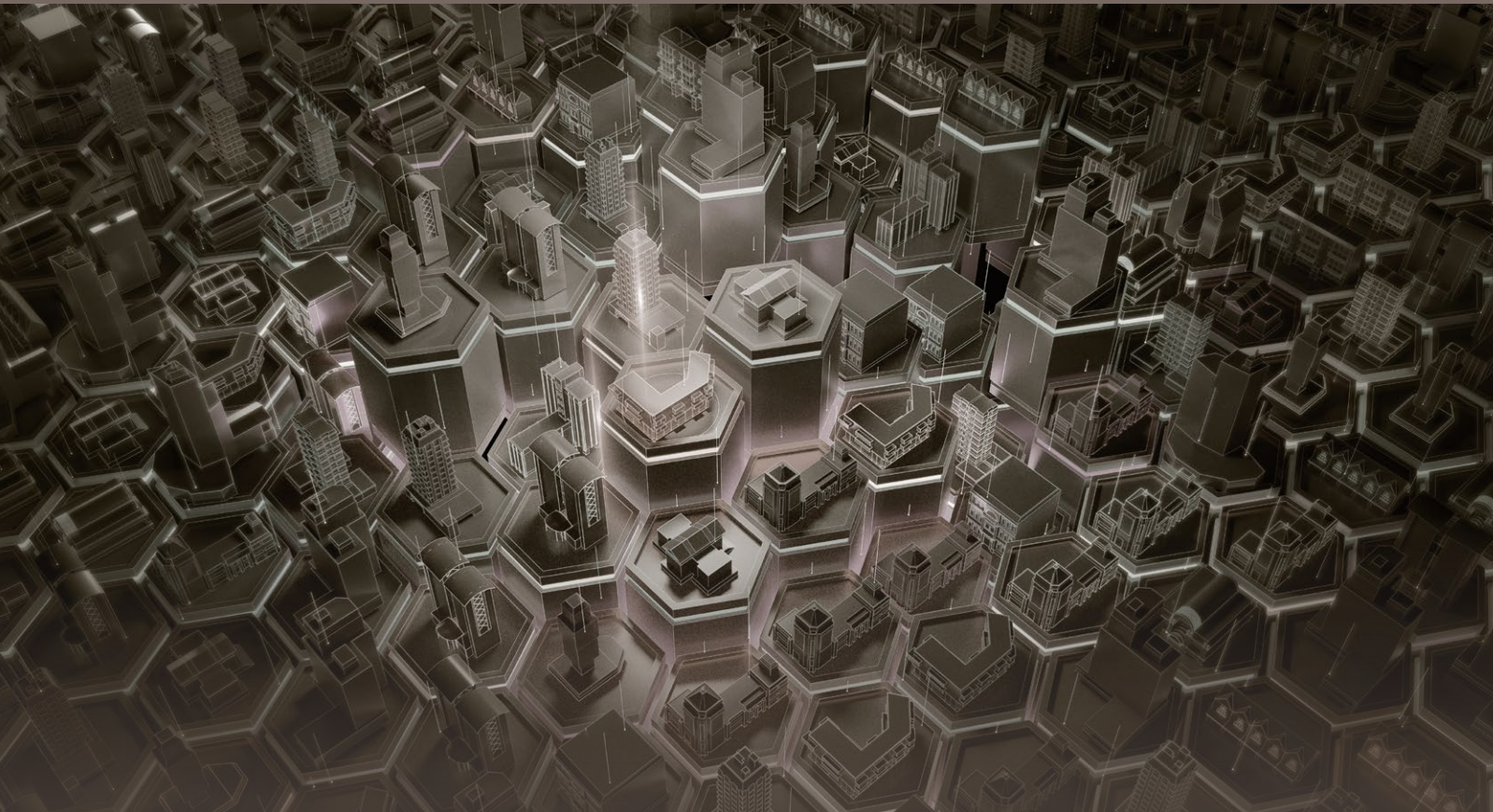
when it moves about three basis points – suggesting investors want a higher return for a higher risk. "In practice, people sell the stock before that day then once the address is reported on, they start buying stocks again and the return goes up," he said. "Such a huge market reaction tells you how important policy can be."

He has also looked at government debt, which can be a positive thing if it is not too high (about 50 per cent of GDP or less) because it enables governments to manage the macroeconomy and respond to emergencies. However, when debt levels get higher, there is uncertainty and risk over how the government will respond. "The higher risk means the future stock returns and future bond returns are going to be higher," he said.

Currently, the US debt is about 100 per cent of GDP. Dr Liu said public approval of government policy is unlikely to counterbalance the impacts of debt because the government response to debt tends to be slow-moving. As things now stand, he is not hopeful for the future fiscal sustainability. "We are heading towards even higher debt. So the risk in fiscal policy will not end in our generation," he said.

CHINA'S JUMPY TAKE ON TECH

For years, the Chinese government treated technology companies with kid gloves, encouraging them to get on with innovating and making money. But in 2020, that changed. Dr Angela Huyue Zhang has been looking into the factors motivating the new hard-line regulation of technology in Mainland China.



In October 2020, Jack Ma Yun, the co-founder of Alibaba Group, gave a speech just days before his company's FinTech arm, Ant Group, was about to launch the world's largest IPO. The speech directly challenged the legitimacy of financial regulation in China. Not only did this result in severe consequences – Mr Ma dropped out of sight for several months, the IPO was withdrawn and the Chinese government launched a major regulatory enforcement campaign against tech companies including the whole FinTech sector, social media, e-commerce and ride-hailing and food services – but it also lifted a lid on the complexities and volatility of regulatory control in the country.

Dr Angela Huyue Zhang of the Faculty of Law untangled why China undertook this 'great reversal' of policy in a recent paper in the *Harvard International Law Journal*.

"In a few short months, China shifted from a previous lax and tolerant approach to a strict and aggressive one, becoming one of the most active and forceful jurisdictions in regulating the digital economy," she said.

While some commentators speculated this was due to political infighting, Dr Zhang sees the response starting firstly with the

authoritarian and hierarchical nature of power in the country, which has its roots in the Chinese Communist Party's revolutionary past when agility and quick reactions at the top were needed to adapt to changing circumstances. "China's volatile style of policymaking is deeply ingrained in its authoritarian governance system, where regulatory authorities need to adhere to central policy initiatives and administrative power is subject to few institutional constraints," she said.

Bureaucratic inertia

The system means that while China's leaders are very powerful, they are also generalists who must delegate decisions to regulators on specific issues. These regulators in turn tend to be parochial and compete with each other, and they are slow to take initiative because they fear making a misstep. "This bureaucratic inertia discourages information transmission from the regulators to the top leadership, leading to a serious regulatory lag," she said.

Lower down the pecking order, tech companies have limited powers and have learned to work within the system by adhering to new rules while lobbying hard behind the scenes for change and building up political capital. Lowest of all are platform participants, such as consumers, small merchants, employees and drivers and courier workers, who have limited channels to voice dissatisfaction and air grievances due to censorship and suppression.

When things come to a head – as they did with Mr Ma's speech – the leaders will swing into action but with the risk of overdoing it. "As public discontent mounts and a regulatory crisis spirals out of control, the top leadership intervenes to avoid threats to social stability. In response to the call from central top leadership, Chinese regulators at all levels quickly react by taking an aggressive stance to tackle regulatory problems," she said.

There are advantages and disadvantages to this system – the leadership can quickly mobilise administrative resources and propaganda to respond to a crisis, but bureaucrats are constrained from exercising their independent professional judgment at an early stage, before a crisis arises. "Furthermore, when the government finally decides to act, there is a risk of administrative power abuse and over-enforcement due to the absence of a transparent enforcement process subject to judicial oversight," she said.



DR ANGELA HUYUE ZHANG

China's volatile style of policymaking is deeply ingrained in its authoritarian governance system, where regulatory authorities need to adhere to central policy initiatives and administrative power is subject to few institutional constraints.

Agility over stability

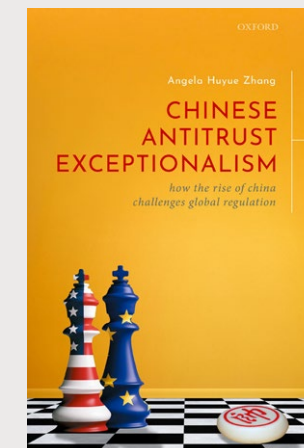
In the case of the tighter regulation of the platform economy, administrative authorities have benefitted from empowerment from the top, she said. More general benefits have also accrued from

measures to safeguard data security, cultivate public support, and reduce China's reliance on the West for technologies and capital. Whether these bring about lasting improvement to social welfare remains to be seen, though, she said.

Dr Zhang calls her model of regulation in China the HAPPY model – for Hierarchical decision-making, Adaptability of leadership, the Parochial nature of regulators, the Pliant nature of firms, and the fact that platform participants such as consumers and merchants need to 'Yelp' to be heard.

"These five core features of Chinese regulatory governance affect and reinforce each other, resulting in regulatory outcomes that tend to favour agility over stability," she said, adding that the model could also apply to other situations. For instance, in the COVID-19 outbreak in Wuhan, local officials largely ignored early warnings by doctors, leading to a consequential delay in controlling the virus followed by a strong-armed and rapid response from the central government.

In the meantime, she points out it is not just China but the whole world that is trying to figure out how to rein in Big Tech. China's experience may offer lessons for global policy debate. "China presents an almost-extreme scenario where government authorities can intervene with lightning speed and velocity. But without strong institutional oversight, intense law enforcement campaigns create the risk of over-enforcement and administrative abuse."



Dr Zhang also recently had a book published by Oxford University Press on the wide-ranging issues involved in China's regulatory regime, Chinese Antitrust Exceptionalism: How the rise of China challenges global regulation.

MEN WIN OUT IN DIVORCE IN CHINA

Professor He Xin's research shows that a combination of institutional constraints on Chinese judges, traditional values about gender, and income inequality frequently result in divorce decisions that are more favourable to men than women.

Divorce in China is, on paper, a gender-neutral matter: couples can apply for what is basically no-fault divorce, domestic violence is a legal condition for divorce, property should be divided evenly, and mediation should be used to find a middle ground. But a new book, *Divorce in China*, by Professor He Xin of the Faculty of Law has found other considerations are carrying greater weight when it comes to divorce outcomes. And often, it is women who lose out.

"The law is quite gender neutral," he said. "But there are institutional constraints that mean it is not enforced in this way. These constraints actually make way for traditional values or political concerns to be considered, which leads to gendered outcomes."

The problems start with the process of filing for divorce. First-time applications are typically denied by judges and couples have to wait another six months to apply again, at which point they are usually approved. That first denial is considered evidence that the couple cannot be reconciled.

However, the first denial even applies if there is evidence of domestic violence – leaving the woman vulnerable to further abuse. And when cases are contested and judges need to decide on property division and child custody, financial and traditional considerations factor in.

The value of property is usually determined by bidding – whoever bids highest can buy out the other party – while child custody is often decided by earning capacity. In both cases, women are usually in the weaker financial position. And for child custody, the men often insist on having the child, especially male children because they want an heir.

Efficiency and stability hold sway

Why do these decisions get made, especially when they run counter to the law, as is the case with domestic violence? Professor He attended trials and interviewed judges for his research. His findings show that the system, which emphasises efficiency and stability, may be pointing judges towards more gendered decisions.

On efficiency, judges are assessed in part by the number of cases they close. Judges have a heavy caseload so they need a fairly quick turnaround to avoid being overwhelmed. Denying the first divorce petition serves that end. "Sorting out complicated issues like property and custody takes a lot of time and energy. If they push it away, the couple might not come back or if they do, another judge might have to handle it," he said.

Stability is also a big concern. If a party is unhappy with a decision and threatens to

kill themselves, the judge or other people, or petitions outside the courthouse – all of which Professor He says are not uncommon – then that can cause problems for the judge and the system. "Men are more capable of making realistic threats to stability and more likely to do those radical things, so the judge then has to compromise more with them and persuade the female to compromise," he said.

"I call these efficiency and stability concerns 'institutional constraints'. The judges I spoke with understood these constraints, but they didn't realise they had such a huge impact on gender equality."

DIVORCE in CHINA

INSTITUTIONAL CONSTRAINTS
AND GENDERED OUTCOMES

XIN HE

Divorce in China: Institutional Constraints and Gendered Outcomes was published by NYU Press in 2021.



Sad results

The results can be dangerous. For instance, on domestic violence, not only is the first petition usually denied, but the fact of domestic violence is often 'erased' in subsequent proceedings, even if the judge originally found evidence of violence. This is because after a trial period, both parties are required to undergo mediation – something judges also prefer because it means the decision will not be appealed. "But to get that mediated outcome, one doesn't really want to raise the issue of



PROFESSOR HE XIN

The judges follow strictly the law and the instructions of the Supreme People's Court and they think their decisions are neutral. But they are ignoring the underlying socioeconomic inequality between the two genders, which affects the outcomes.

domestic violence because the man will deny it and it will become harder to get a deal," he said. "Once it's mediated, everything is covered up and buried, so there is nothing unlawful on the record."

The divorce process also means women are more likely to be discouraged from fighting for child custody or a fairer share of property if they want the divorce to be granted quickly. Some 70 per cent of divorce petitioners are women.

"The judges follow strictly the law and the instructions of the Supreme People's Court and

they think their decisions are neutral. But they are ignoring the underlying socioeconomic inequality between the two genders, which affects the outcomes. Isn't that a little sad?" Professor He said.

He is not hopeful that things will improve, although he hopes his book will spark discussion about reducing the burden on women in divorce proceedings. "It's hard to change the pattern because the government needs a certain index to measure the performance of judges, and stability is always a concern," he said.



A courtroom for civil trials in China.

ALL SYSTEMS GO

A smart city data project could help Hong Kong better coordinate its various public and private transport systems, enabling passengers to enjoy maximum use and spend minimum time getting from A to B.

Transport systems often don't talk to each other – ferry schedules don't necessarily link up with train times, buses don't stop in the exact location you want, ticket deals may be lacking – but now, using a unique combination of data from the government and private service providers, the pioneering Intermodal Transport Data-Sharing Programme could pave the way for transport operators and payment providers to cooperate and share data to optimise transportation systems.

Dr John Ure, former Director of Telecommunications Research Project (TRP) and research consultant for HKU, came up with the initial idea for the study, and invited the Faculty of Architecture's Department of Urban Planning and Design to collaborate. The six-month study was funded by the Innovation and Technology Fund, and HKU took on the role of a trusted third party supported by contributions from transport stakeholders such as MTR Corporation Limited, The Kowloon Motor Bus Company (1933) Limited, Citybus Limited and New World First Bus Limited, Octopus Cards Limited and Arup.

"A vital factor underpinning the whole project was HKU's establishment of a Data Trust, created in compliance with the Personal Data Protection Ordinance and best practices on data security, enabling the University

to access and analyse aggregate data on passenger journeys, times of day and routes into and out of Exchange Square in Central," said Dr Zhou Jiangping, Associate Professor in the Department of Urban Planning and Design.

He explained that HKU's roles in the project included: compiling data sharing Memorandums of Understanding among different stakeholders, which acted as necessary 'software' for the programme; utilising IT mechanisms (such as data hashing algorithms and a secure data transferring software package) and hardware (for example, a secure and dedicated workstation to store the data) that allowed the team to pool, link, share, and analyse the data contributed by different stakeholders, especially local transit operators; and undertaking a pilot research project on intermodal travel at Exchange Square, which demonstrated the value of intermodal data sharing.

Value of intermodal data

The findings have now been published and revealed some interesting facts about – and gaps in – the city's transport systems and the way data is currently used. "Much of the transport data, especially the value of intermodal transport data had not been fully recognised by the local

transit operators," said Dr Zhou. "For instance, X bus operator did not know how many of its riders also use services of Y bus operators, nor when and where.

"In addition, many transit operators do not have the time and human resources, especially staff with sufficient and up-to-date technological capacities, to fully exploit the various data that they do have.

"Finally, only by putting data from different stakeholders – for example Octopus data from different local transit operators – did we learn better how many local people ride different modes of public transit and how local public transit system can better serve them. Most notably, if we had only Octopus data from one transit operator, for example X bus operator, we found many riders to Exchange Square made only one bus or metro trip on a weekday. We would not know why unless we had trip



DR ZHOU JIANGPING

Only by putting data from different stakeholders – for example Octopus data from different local transit operators – did we learn better how many local people ride different modes of public transit and how local public transit system can better serve them.

records of these riders' Octopus journeys across all modes of transit in Hong Kong. Our collaborators from Arup did a lot to help in this regard."

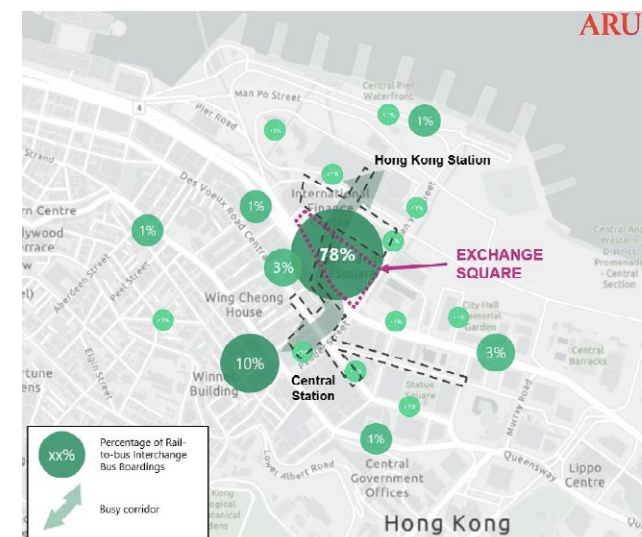
Proof of concept

The overall aim of the programme was to develop a proof of concept to show that data sharing is possible using a trusted third party model to replace the siloed approach whereby each transport operator or service provider only shares a limited amount of data with government or for the purposes of limited scope, mode-specific research. "Data sharing enables data analytics to reveal insights into travel behaviour where different modes of public transport are involved and to identify where service needs are not being met or where service quality could be improved and when," said Dr Zhou.

"Many public transport trips involve using services provided by more than one local transit operator. The pooled data from different operators enables us to know better about these trips, and is indispensable for designing and improving a multimodal transport/transit system. Such a system would be beneficial to both individual transit operators and passengers. Of course, it would also have economic and environmental benefits for society too.

"In fact, there has been an emerging system called 'Mobility as a Service' (MaaS) in the transport field," he added. "MaaS is believed to create more win-win situations for different stakeholders such as the government (regulators of transit), transit operators, shared-bike companies, ride-hailing companies, businesses and passengers. A streamlined and convenient intermodal transit trip would entice more people to use public transport, which would be much cleaner and greener than private cars when there are an ever-increasing number of riders."

Asked how this method of data collection across entities could also be put to use in other areas, Dr Zhou said: "Businesses (for example, credit card data across businesses), environmental protection (such as the different pollutants being expelled by different entities), housing, and infrastructure development."



A majority of bus boarding (around 78 per cent) for rail-to-bus interchanges occurred at the Exchange Square public transport interchange. Furthermore, almost 90 per cent of these interchanging passengers walked along the north-south corridor of the MTR Central and Hong Kong stations to transfer between the two modes, as indicated by the translucent green arrow.

EVAPORATION REVELATION

A collaborative study between mechanical engineering and biomedical sciences has found evaporation may have played an important role in the origins of life and could provide a new path of exploration into how living things are formed.

One of the problems with trying to research the hypothetical ‘primordial soup’ from which all life may have emerged is how to separate the elements which led to the first living cells being formed. Now, a research team has found that evaporation could facilitate compartmentalisation of the relevant biochemical compounds and may provide an environment within which early evolution could have begun.

Long-term collaborators Professor Anderson Shum from the Department of Mechanical Engineering and Professor Julian Tanner from the School of Biomedical Sciences were working on another project when the discovery came to light.

“The aim of the original project was to develop new ways to identify nucleic acid sequence (often known as aptamers) that has selected properties such as for RNA imaging,” said Professor Shum. “Then in the process, our group observed the phenomenon induced by evaporation from droplets that we observed.”

“When I put a droplet containing polyethylene glycol (PEG) and dextran under the microscope, an exciting phenomenon appeared,” explained Wei Guo, PhD student in Professor Shum’s group. “During the evaporation, hundreds of immiscible tiny daughter droplets emerged from the initially homogeneous, clear droplet. The decrease of the water content leads to an increase in polymer concentrations, resulting in phase separation that drives this fascinating evaporation-driven phenomenon.”

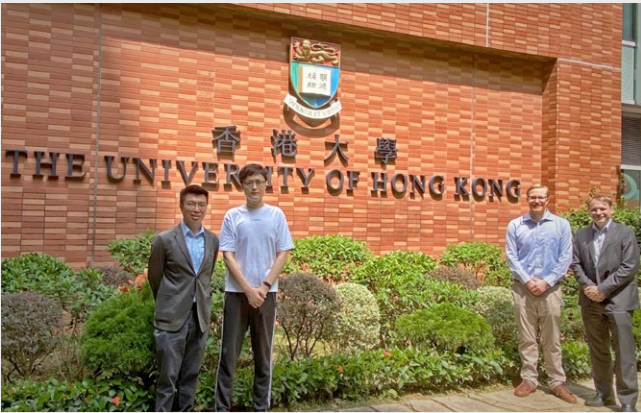
“We discovered that the nucleation of new immiscible daughter droplets in the original droplets can be used for enrichment of nucleic acids,” added Professor Shum. “Our two teams discussed the

phenomenon and we came up with the idea of using the system as a model and analogy for studying prebiotic compartmentalisation in droplets.”

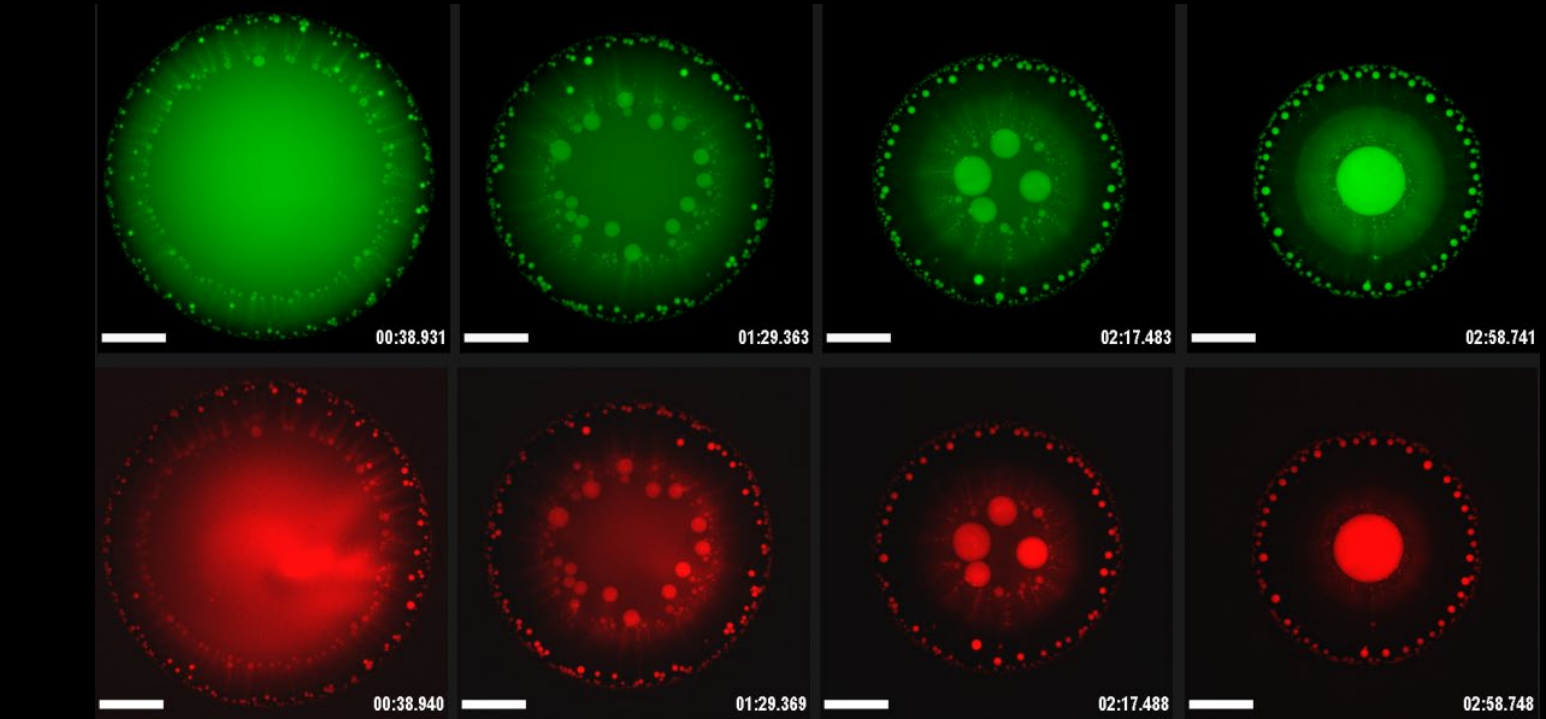
The work has been published in *Nature Communications*, in an article entitled ‘Non-associative phase separation in an evaporating droplet as a model for prebiotic compartmentalisation’.

Potential mechanism

Previously, scientists had hypothesised that liquid-liquid phase separation (LLPS), a means by which membraneless organelles form inside cells, might work as a potential mechanism for prebiotic compartmentalisation. But creating a suitable ‘primordial soup’



(From left) Professor Anderson Shum and Wei Guo from the Department of Mechanical Engineering, and Dr Andrew B Kinghorn and Professor Julian Tanner from the School of Biomedical Sciences.



The image shows the evaporation-induced phase separation process inside an all-aqueous sessile droplet (Scale bar: 500 microns). Upon evaporation, the concentration of Polyethylene glycol (PEG) and dextran increases and incompatibility arises, forming tiny dextran-rich droplets (green fluorescently labelled) dispersed in the continuous PEG-rich phase. These tiny dextran-rich droplets move towards the centre of the sessile droplet with the inward Marangoni flow. Compartmentalisation and localisation of biopolymers like nucleic acids (red fluorescently labelled) inside these dextran-rich droplets are achieved, with great potential in serving as all-aqueous reactors for a wide range of biochemical reactions.

in laboratory settings had proved elusive, particularly since the concentration of ingredients involved in the LLPS needs to be adequate for the onset of phase separation.

“Basically, if you add two water soluble additives, such as salt and sugar, to water, at low concentrations, you only get one homogenous aqueous solution containing both salt and sugar,” explained Professor Shum. “However, at high enough concentrations of salt and sugar, you can actually form two immiscible aqueous phases, one rich in salt, and the other one rich in sugar.

“Such a phenomenon is known as aqueous liquid-liquid phase separation. This type of phase separation process depends a lot on factors, such as pH values, temperatures and salt concentrations. Once you have the aqueous daughter droplets in the larger aqueous droplet, the daughter droplets can preferentially enrich other macromolecules that prefer the daughter phase and are more soluble in it.”

Enriched molecules

Significantly, the research team found that through the evaporation of droplets, LLPS can be triggered significantly and the molecules arising from it are subsequently enriched. When evaporation occurs, the water content in a droplet decreases, leading to an increase in the polymer concentration, and it is this dissolution of the bigger droplet into smaller ones that could be used for further research into living cells.

“The work can be used for enriching small molecules in the aqueous environment,” said Professor Shum. “This can be applied to disease biomarkers, enrichment of which will facilitate their detection and disease diagnosis.”



PROFESSOR ANDERSON SHUM

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He also welcomes feedback from other scientists on their discovery. “Science discoveries always lead to even more exciting questions,” he said. “We continue to explore collaborations with different partners, who may find uses with our approach to do work on enrichment of molecules.

“We are also involved in a collaboration where we are using this approach for the enrichment of small particles that can exhibit structural colours as characteristics of the separation distance between the particles. This can have potential applications in optics.”

THE COMMON CORE TURNS 10!

For the past decade, HKU's innovative Common Core programme has been taking all undergraduate students out of the comfort zone of their majors and into new horizons.

In 2012, HKU and all universities in Hong Kong switched from three-year to four-year undergraduate programmes. But HKU added an innovative twist with the launch of the Common Core, under which all students must take six courses alongside peers from outside their majors to explore common human experiences from a multidisciplinary perspective. As it enters its second decade, the programme rides a wave of success that includes the University Grants Committee's Team Teaching Award 2019 and its continued progress in pushing at boundaries near and far.



The Global-Action-Lab Exchange with Utrecht University around the concept of More-Than-Human-City has students from HKU and Utrecht University collaborating in-person and virtually, co-creating transdisciplinary research strands, events for public participation, and creative, scholarly, media outputs.

Since its launch, more than 500 teachers and more than 200,000 student enrolments have participated in the 290+ courses offered under the Common Core. While courses form the bedrock of the experience – with students studying topics as diverse as climate change, identity formation, technology and corruption in society – the contours of the Core have expanded greatly under the directorship of Professor Gray Kochhar-Lindgren, who joined HKU in 2014.

International exchanges and transdisciplinary undergraduate research have been introduced, top companies and NGOs have been recruited as 'learning partners' who have spurred new initiatives, overseas institutions have been invited to partner through the Global Liberal Arts Design Experiments (GLADE) initiative, and Common Core minors have been established so students can pursue topics of interest in more depth.

"The courses are central, always, but we've also collaborated with others to develop a culture of attraction, curiosity and experimentation and to build connections across every possible scale," he said. "Student agency and students-as-partners run through everything we do."

Research and reflection

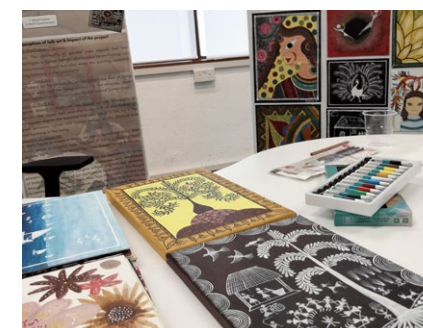
One of the key aims has been to ensure the Common Core delivers on the University's teaching aims, particularly interdisciplinarity and international visibility. A recent example was a pilot programme in which 10 HKU

students from engineering, biomedicine, social sciences, law and other disciplines collaborated online with students from the University of Queensland to consider well-being from the perspectives of film, art and the resonance of objects, culminating in a joint presentation and plans for expanding the collaboration.

In another recent project, students worked with Arup, a global design and engineering firm, to study night-time lighting design. They were trained to use light-measuring equipment, then went into the community to measure night light in various places, observe how people reacted there, and reflect on their own reactions. Their analysis and recommendations were then presented to the company.

Dr Jack Tsao, Associate Director of the Common Core, has steered the development of these and other student projects. "Our partnerships with businesses have been quite useful because they facilitate the whole process of creating knowledge exchange and very good connections for our students," he said.

Such projects also illustrate the programme's ambition of redefining research for undergraduates. "Not surprisingly, when students first come in, most of them think research means only a traditional scientific experiment in a laboratory or a specific methodology tied to their discipline. All that is of course important, but we're trying to loosen up their imaginations around research," Professor Kochhar-Lindgren said. A key part



Interdisciplinary projects undertaken by students through the Common Core Transdisciplinary Undergraduate Research Initiative and the Bachelor of Arts and Sciences programme were showcased in the I-Squared: Interdisciplinarity and Impact Student Showcase and Networking Event in 2021.

of that is getting them to reflect on their own habits. "All of our research facilitators and mentors do all we can to get that reflective moment built into these programmes because otherwise, learning tends to dissipate too quickly. We want to create iterative paths of learning."

Giving students agency

An international perspective has also been promoted through adoption of the United Nations' Sustainable Development Goals (SDGs) to frame courses and initiatives, as well as through the founding of GLADE in 2018.

"Our attitude is that we should put students in a rich learning environment that's well-structured but not rigid, give them as much

agency as possible, have clearly shared learning goals, and offer a venue for the public presentation of their work. The results have been quite amazing," Professor Kochhar-Lindgren said.

The multiple strands of the Common Core are exemplified in an initiative funded with the UGC teaching award grant, called Critical Zones: Gender, Cities, and Well-Being, which has used student peer mentors, project-based learning and international collaborations to develop activities related to the SDGs of gender equality, sustainable cities and communities, and good health and well-being. The project is nearing completion and has resulted in student transdisciplinary research, deepening engagement with the SDGs, and collaborations on campus, in Hong Kong, and overseas.

Professor Kochhar-Lindgren attributes the success of the Common Core to its original design in 2012, a strong commitment from the



HKU students from different disciplines collaborating online with students from the University of Queensland via a virtual exchange programme.



**PROFESSOR GRAY
KOCHHAR-LINDGREN**

The courses are central, always, but we've also collaborated with others to develop a culture of attraction, curiosity and experimentation and to build connections across every possible scale.

University's Senior Management Team and extraordinary efforts by administrative staff and teachers and tutors who have experimented with innovative teaching styles and assessments. Most importantly, HKU students have been deeply engaged in Common Core courses, consultations, sharing, and projects, he said.

Looking ahead, he sees the Common Core focussing on helping students develop 'future readiness' and further expanding its capacities in interdisciplinarity, internationalisation and hybrid forms of learning. It will also continue serving as a sandbox for the University in finding new ways to engage, experiment and enjoy teaching, learning and research.

LEADERS OF TOMORROW

A new course teaches students leadership skills and how to use them creatively and purposefully to enhance their own growth and to solve real problems in the 21st century.

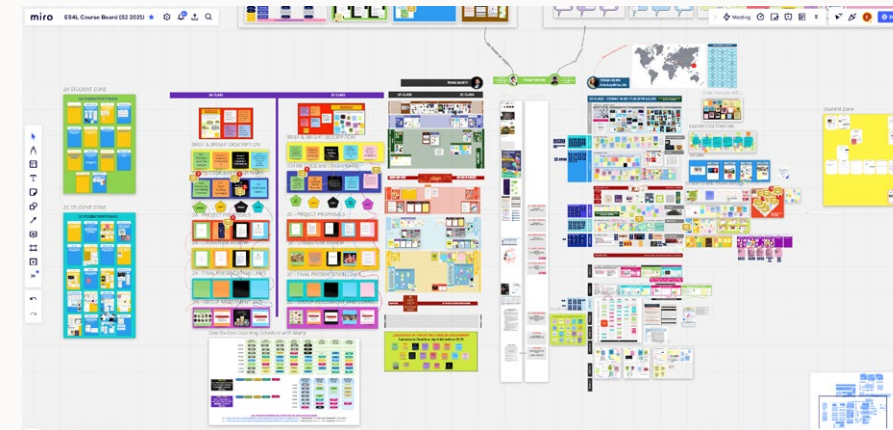
Entitled 'The Leadership Development Course on Culture, Science and Society', the programme aims to complement the hard skills undergraduates learn through formal education with soft skills such as concepts of leadership, working with others in teams and engaging with diverse people and unique ways of thinking.

The course, which is part of the new Bachelor of Arts and Sciences (BASc) degree programme which covers subjects across the Faculties of Arts, Science and Social Sciences, is designed to help students understand how their personal leadership growth may lead to fresh ideas and strategies which positively impact their university studies, their community, and their future career prospects.

"Soft skills are key to success for 21st-century graduates," said Dr Helen Lockey, co-designer and co-instructor of the course. "We dovetail concepts of leadership and teamwork with the concepts of purpose, values and innovation, and also active listening – an oft-ignored aspect of leadership."

While acknowledging that social distancing may have had a negative impact on some aspects of students' personal growth, Dr Lockey points out that leveraging technology has resulted in a positive impact not only on students' growth, but also their development. "We're witnessing new ways of learning and teaching. The design principles we've upheld in course development is that the hands-on, tactile, on-campus experience must be replicated as far as possible in the virtual learning space. We leverage the most appropriate tech platforms in order to achieve this in-class experience, and in some respects, it's as good as, if not better than the 'real' experience."

"The course has its own dedicated board on Miro, an online collaborative workspace.



The course board, created on the Miro collaborative platform, facilitated learning, group work and teaching in the virtual learning space.

It's been amazing how this platform has facilitated learning, group work and teaching. Student engagement, we believe, has been enhanced as a result of the way in which the course is designed and subsequently experienced."

Cultural expertise

The cultural aspects of the course come in the Leadership in Practice part. Said Dr Marty Forth, Assistant Lecturer, Faculty of Social Sciences: "Students work in small groups to develop a product that increases the collective knowledge about one protected element of Hong Kong's intangible cultural heritage (ICH). They ultimately become experts on this one aspect of Hong Kong's rich cultural traditions after they write a proposal, do a literature review, and engage in creating something that celebrates that element of ICH. As part of the process, the students put their product out into the world and seek to understand the impact they have on educating others."

ICH projects undertaken by students on this year's course include: creating a DIY package on bamboo shed theatres; cheongsam or *qipao* making techniques; an HK Milk TEAm/ Nai Cha Instagram page; an educational package on making tofu; a children's book celebrating Chinese wedding ceremonies and puppetry; workshops on the Fusion of Chinglish and traditional Chinese Opera; and arranging public tasting events for Dragon Beard Candy.

"The key to this part of the project is coming up with strategies for conservation, preservation and awareness-raising," said Dr Lockey. "Students are often seduced into the classic 'Describe-it-to-me' model of learning, where they simply tell you about a specific ICH. We expect much more than this: they have to deliver innovative strategies for 'How-to-keep-it-alive'. They are guided towards this goal not only through the lessons, but also in group consultations where their ideas are critiqued, questioned and challenged. Many students leverage the power of social media to get the message out – some have been very innovative and experimental. But others have used good, old-fashioned face-to-face engagement. For example we had a group which re-conceptualised traditional tofu recipes for the younger generation, made it and then served it in class. Brilliant!"

Every student completes the course with a Personal Leadership Development Plan (PLDP). "Each student writes goals for themselves," explained Dr Forth. "Professional or career, academic and personal focussed goals for things they plan to achieve in their future. Each of these goals is then supplemented with required tasks with completion dates which detail more specifically how each goal will be completed."

"We have also learned that the most impactful part of the PLDP design process is the individualised one-on-one coaching that each student gets with a member of the course teaching staff. This support is designed around



DR HELEN LOCKEY

Student engagement, we believe, has been enhanced as a result of the way in which the course is designed and subsequently experienced.

the student learning about themselves, being guided and supported in their decisions, and receiving mentoring. It is a key part of this course because all leaders need to learn to mentor and be mentored in return."

Dr Forth explained that the PLDP can also be used by each student's Faculty-assigned academic advisor as a conversation starter about what the student is seeking to do at HKU academically, and where they see themselves after graduation. "Why reinvent the wheel! Academic advisors can continue the conversation using the goals and tasks the student created as part of the class, and offer the student ongoing support and coaching."

"This course is eclectic and thought-provoking," said Dr Lockey in conclusion. "It's also demanding, but we believe that the experience can be transformational."



One of the intangible cultural heritage projects undertaken by students on the course was a children's book *Ying is Married* celebrating Chinese weddings and puppetry.

EARLY DETECTION TO BEAT LIVER DISEASE

The introduction of a screening programme for people at high risk of contracting hepatitis C aims to reduce transmission by discovering cases early and treating them.

Drug addicts in rehab were the biggest target for the programme, one of the highest risk groups for the hepatitis C virus (HCV) which is usually transmitted through contact with blood, bodily fluids or sexual intercourse and from mothers to babies during pregnancy.

“Chronic infection with HCV can lead to liver cirrhosis, liver cancer or death,” said Dr Loey Mak Lung-yi, Clinical Assistant Professor at the Department of Medicine. “But at the early stages, infection is mostly asymptomatic implying that infected persons are usually unaware of the condition.

“Yet, HCV infection can be easily cured with the availability of highly active direct acting antivirals (DAA), usually administered orally for 2–3 months with minimal side effects. Therefore, the potentially serious complications from HCV can be effectively prevented. Finding the infected people and directing them to treatment is one of our main goals for HCV elimination.”

The overall scheme is taking a micro-elimination approach to the virus, which involves definition and segmentation of population groups by demographics, such as

age, subpopulations, environmental factors, geographical areas and premises, for which tailor-made measures are designed and implemented to gradually eliminate diseases.

Rehabilitated drug addicts

Rapid tests were carried out on rehabilitated drug addicts and 117 out of 140 people – or 80 per cent – proved positive for HCV, which is slightly higher than the original expected prevalence in Hong Kong. However, Dr Mak explained that HCV prevalence in Hong Kong is not high (0.3 per cent) for the general population, and this is one of the reasons it is not cost-effective to conduct population-based screening of HCV.

“Since it is a blood-borne virus, it is much more commonly found among high-risk groups – for example people who inject drugs (PWIDs), people infected with human immunodeficiency virus, men who have sex with men, people who were transfused with contaminated blood products or transplanted

with infected organs, and people with chronic renal failure on haemodialysis that are exposed to contaminated bodily fluids.” Therefore, targeted screening of high-risk groups is a more pragmatic approach than population-based screening.

“Screening is simply performed by testing a small amount of blood for viral materials, be it viral nucleic acid or viral protein. With the advancement in medical technology, point-of-care tests can be used for screening on-site, allowing rapid determination of HCV status, thereby reducing drop-out rate from repeated clinic visits or blood tests. Once an individual is confirmed to be HCV-infected, the rest is straightforward clinical management that conforms to standard practices.”

The programme was also able to reduce patient wait time by establishing a Linkage-To-Care clinic to manage the HCV-infected PWIDs identified from this project. “The clinic is not part of routine clinical service, but rather, a research clinic that is mainly supported by the research team at HKU Medicine (Hepatology),” said Dr Mak. “Therefore, the wait time is significantly shorter than clinics run under the Hospital Authority services.”

Eligibility enhanced

Other recent developments in patient eligibility for treatment have also helped make such a programme feasible. “Prior to October 2020, only patients with cirrhosis or prior organ transplant could receive fully-subsidised DAA under the Hospital Authority’s policies,” said Dr Mak. “In other words, if an HCV-infected individual had minimal liver disease, he/she

would have to purchase the DAA at his/her own cost – an amount that was not affordable by most patients.

“Fortunately, since October 2020, the Hospital Authority has broadened the indications of fully-subsidised DAA for all HCV-infected individuals. Subjects previously not eligible were subsequently prescribed with DAA following the policy amendment. According to international clinical guidelines, every HCV-infected individual should be treated with DAA, unless the person has limited life expectancy from other non-liver related conditions. Therefore, we were able to treat all HCV-infected PWIDs who attended the clinic with fully-subsidised DAA.”

Currently, the team is following up HCV-infected PWIDs identified from the programme for DAA and treatment response. “Plans to continue the programme for other high-risk groups are being contemplated but uncertainties abound due to the current COVID-19 situation,” said Dr Mak.

“But, quite simply, the major obstacles to conquering HCV lie in identification of infected individuals and engagement in the healthcare system. Our vision is that all HCV-infected people can be treated as soon as possible, which needs joint effort from multiple stakeholders to facilitate HCV elimination.”

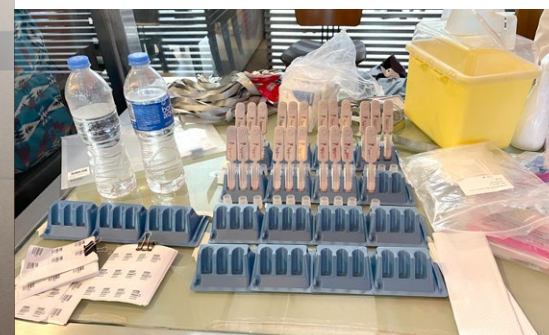


DR LOEY MAK LUNG-YI

The major obstacles to conquering hepatitis C virus (HCV) lie in identification of infected individuals and engagement in the healthcare system. Our vision is that all HCV-infected people can be treated as soon as possible, which needs joint effort from multiple stakeholders to facilitate HCV elimination.



Dr Mak explaining the facts of hepatitis C infection and the project details to the staff and study participants in a halfway house in Kwai Chung.



Point-of-care test kits were put on a rack. It took about 20 minutes for the result to be ready after a drop of blood was collected from the participants.



The research team – (from left) Miss Delanda Wong (research nurse), Professor Yuen Man-fung and Dr Loey Mak Lung-yi.



HKUMed's micro-elimination approach has successfully screened 80 per cent of hepatitis C cases and significantly reduced time to treatment by 70 per cent.

Food for Thought

Food is more than a source of sustenance and pleasure. It is also a vehicle for thinking more deeply about the human condition and our place in the world, as explored by Dr Joe Lau in a recent knowledge exchange project.

Making philosophy accessible to a wider audience has been a mission for Associate Professor Dr Joe Lau. He created the Critical Thinking Web a few years ago that has been accessed by thousands of schools around the world to help teach students this skill. More recently, he has applied philosophy to a topic of wide appeal that has often been neglected in his discipline: food.

Philosophers traditionally have dismissed eating and other bodily pleasures as being of a lower order to the higher pursuits of thinking and exercising the intellect. Dr Lau, on the other hand, sees food as a way of getting people interested in philosophy.

"Food is perhaps the most universal interest that people have, but it is not just about enjoyment or nutrition or health. There are other dimensions, especially political ones, moral ones and aesthetic ones. Many people don't think about these aspects of food," he said.

"I think it's important to reflect more deeply about some of these issues because they have serious implications for personal health, for social democracy, for justice. The future of our planet is also very much connected to how we produce and consume foods. Philosophy should not neglect this."

Dr Lau is promoting these ideas through a Knowledge Exchange Fund project that has led to the publication of a Chinese-language book for the general public, *The Way of Philosophy and Food*, published last year, and a new website that echoes the book's themes called Food and Philosophy.

Animal rights, the nature of taste and other ideas about food

He uses philosophy to explore 10 topics related to food – the morality of eating meat; animal rights; world hunger and whether we have a duty to help those in need; the question of why it is legal to eat junk food but not take drugs; whether we are 'playing God' with genetically-modified food; capitalism and food and whether the free market is a good market; whether food can be considered a great work of art; 'bad' taste and whether beauty is in the eye of the beholder; sweet and sour tastes and whether objective science can explain subjective taste; and food and meaning – do we eat to live or live to eat?

The pros and cons are presented for each topic through text and short videos (on the website) to encourage critical thinking about these food issues.

For example, when it comes to the taste of food, there is debate about whether this is determined by the known physical properties of food and human tastebuds, or something else such as our perceptions of what a food should taste like and whether a person has the ability to taste. "Can objective science completely explain the subjective aspect of our taste experience? If so, how? If not, does it mean that there is



DR JOE LAU

Food is perhaps the most universal interest that people have, but it is not just about enjoyment or nutrition or health. There are other dimensions, especially political ones, moral ones and aesthetic ones.

something in the universe that is forever beyond the reach of science?" Dr Lau asks on his website.

Similarly, aesthetics can appear both objective and subjective. "When it comes to wine tasting, for example, some people will say there is no good wine or bad wine – there is just wine that you like or not. That's a kind of subjectivism about the evaluation of tastes and yet, we often defer to experts and wine ratings when buying wine. We think there's no objectivity but behave in a way that assumes there are objective standards," he said. This conundrum also applies to artistic and aesthetic appreciation more generally.

Philosophy in daily life

Dr Lau found the topic on capitalism, which looks at the pros and cons of the 'free market' and negative externalities such as the environmental impacts, personally enlightening. "The connection between food and capitalism is not something I had thought about a lot before. Many people take the economic role of capitalism for granted without thinking about the social or environmental costs of free markets and capitalist production. Given the severe global problems that we're facing, especially in connection to climate change, I think it's extremely important for all of us to think more carefully about these issues and make a decision about what we can do to save the world."

The book has been well received by readers posting comments on social media and at talks Dr Lau has given at local independent bookshops, which validates his aims. "The most important value in this project is to promote these ideas in philosophy and get people to think about them. I want to help people see how philosophy can apply to daily life and maybe make a difference to how we think about these practical issues," he said.



The Way of Philosophy and Food was published in Chinese in 2021 by Oxford University Press (China).



Learn more about the Food and Philosophy website (Available in both Chinese and English)

YOUR RIGHT TO TECHNOLOGY

Access to COVID-19 vaccines, broadband connections and other beneficial technologies should be a human right, argues legal scholar Dr Haochen Sun in a new book.

The COVID-19 pandemic has made abundantly clear that new technologies are critical to modern life. We have needed internet connections to sustain school, work, entertainment and social ties, and widespread distribution of new vaccine technologies to resist the virus. However, access to technology has been far from universal. Against that backdrop, Dr Haochen Sun of the Faculty of Law has produced a new book, *Technology and the Public Interest*, that seeks to address the problem of unequal access to technology.

His premise is that technology is a human right and should be used in the public interest. This concept is not new – it is

included in the Universal Declaration on Human Rights, which was adopted by the United Nations in 1948 in response to the great harm caused by technologies such as gas chambers and atomic bombs, with the aim of promoting technology in the service of humanity. “But it has become a dead human right. Have you ever heard of it?” he said.

Dr Sun aims to breathe new life into this right. There are various reasons why it has fallen off the radar, he said – such as the difficulty of defining technology and the inadequate enforcement of other human rights – but the biggest obstacles are posed by intellectual property (IP) rights. The time has come to address the issues.

“During the past few decades, international leaders have pushed for a higher level of protection of IP rights as a way to ensure technological benefits will be disseminated through market-based modes. This means the IP owner in many cases has final say over who gets access to the technology they develop, normally through fees that they charge,” he said.

Corporate responsibilities

The problem with this became apparent during the pandemic. Unequal distribution of COVID-19 vaccines and varying charges that countries paid for those vaccines is an obvious example; some people have not even received

their first vaccinations, while others are on their fourth dose. But there were also inequities in daily living.

Without sufficient internet access at home, students could not keep up with classes, workers could not attend online meetings, and important online social events, such as weddings and funerals, were missed. It also meant more difficulty getting information about the pandemic and making bookings for vaccinations. Even simple things like fending off boredom during lockdowns by watching videos or streaming services were not possible.

“The pandemic has made the problem of access to technology visible,” he said. “The internet has become as important as electricity. We cannot live without it. That’s why I argue we should define technology as a fundamental human right.”

Access is not the only problem. Dr Sun began working on his book before the pandemic started, following cases in which tech companies abused their power, such as Facebook sharing users’ personal information with Cambridge Analytica, which was the worst privacy breach in human history, and the American hedge fund manager who bought the patent to the drug Daraprim and overnight jacked up prices from US\$13.5 per tablet to US\$750.

“There’s an asymmetry of power. Technological companies have unprecedented power to regulate individual user’s lives and society’s operations. I argue we should re-think the nature and scope of their responsibilities.”



DR HAOCHEN SUN

Technology has become the major driver of our economic, cultural and political life. We have to talk about access to technology as a human right so that everybody can benefit and we can prevent serious harm caused by improper application of the technology.

He believes tech companies should reciprocate to users who contribute to their technologies’ development, such as participants in COVID-19 vaccine trials who have contributed to vaccine development and individuals who upload video content to YouTube and TikTok.

Second, tech companies have an ethical role responsibility as innovators that they should properly fulfil to benefit society, just as the captain of a boat has a role responsibility to transport people and cargo safely.

And third, tech companies have a responsibility to confront injustice caused by technological progress, he said.

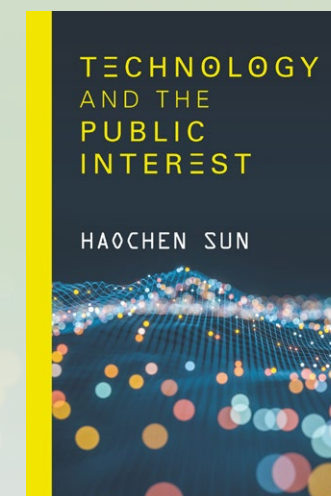
A collective right

Dr Sun’s book also wades into the question of individual versus collective rights and how that interacts with IP protection. “I argue that the right to technology should not be defined as an individual right but protected as a collective right, because it is in society’s interest to share the benefits and prevent harm that technology can cause.”

This collective human right should be protected under both international law and domestic civil rights law, he said, and could potentially become a fundamental right under domestic constitutional law – meaning citizens could sue their governments if they are cut off from access.

Dr Sun stressed that he does not advocate everyone having access to an iPhone or other non-essential technologies. Rather, they should have access to the internet infrastructure that supports these, just as roads provide access to all.

“Technology has become the major driver of our economic, cultural and political life. We have to talk about access to technology as a human right so that everybody can benefit and we can prevent serious harm caused by improper application of the technology. I think this will become a frontline issue in human rights protection for years to come.”



Technology and the Public Interest

Author: Haochen Sun
Publisher: Cambridge University Press
Year of Publication: 2022

IDENTITY DRAMAS

Television and online dramas in China increasingly include diverse portrayals of gender, which sit awkwardly alongside the hardening conservative attitudes of the government and even viewers. Dr Song Geng has been studying the paradox.

Portrayals of gender in popular culture both construct and mirror a society's ideals of women and men, in which case Chinese dramas are sending decidedly mixed signals, said Dr Song Geng of the School of Chinese, who explores the phenomenon in his new book *Televising Chineseness: Gender, Nation and Subjectivity*.

"There is an interesting paradox in Chinese popular culture today. On the one hand, there is a growing diversity of gendered images, like the feminine man, and some inexplicit queer elements. These images are non-conforming, non-mainstream types of gendered images. But on the other hand, there is a revival of patriarchy, that is, the ideology of male dominance and worship of a fatherly image. It's obvious that the heterosexual norm is still regarded as the dominant ideology," he said.



'Little fresh meat' images: Bo Jinyan (left) and Fu Ziyu (right) in *Love Me, If You Dare* (2015).

Drawing on textual analyses of popular dramas and focus group and online feedback from a broad range of viewers, he shows how the two manage to sit side by side because, in the end, the patriarchy is not disturbed.

Heavy-handed censorship is wielded over 'moralistic' aspects such as sex scenes and explicit LGBTQ [lesbian, gay, bisexual, transgender and queer] representation, while storylines do not, in the end, subvert the gender order. However, audience response and preferences suggest that viewers are favouring a more diverse range of characters.

'Feminine man' and 'supreme heroine'

The 'feminine man', for instance, is very popular with young women. These characters, called 'little fresh meat' in China, are young, handsome, inexperienced in love and have an appearance and behaviour that is considered more effeminate. They show obvious influence of the male aesthetic in Japanese and Korean popular culture.

"They represent the ideal boyfriend for the female characters," he said, and are popular among young women. Even young men follow their model – Dr Song has noticed some of his students imitating the dress and hairstyles of these characters.

There is a backlash online against the feminine man, who is said to make the country look weak compared to Western 'he-men' such as football players. By comparison, resistance to effeminate men in the West is underpinned by homophobia.



Contrasting images of Luo Zijun before and after her divorce, reflecting her transformation from a shallow housewife (left) into an astute career woman (right) in *The First Half of My Life* (2017).

"A common quote among those who criticise it is 'if young men are effeminate, China is effeminate'. They will also say, 'if there's a war in future, who can defend the country?'," he said. "But the pro-effeminacy commentators also frame their arguments in nationalist terms. They argue that the diversity of gender images is a signifier of modernity and shows that China is now more open, modern and cosmopolitan."

"Both camps relate gender to the virility of the country, because gender is about how you properly nurture and reproduce the next generation."

When it comes to women, the concerns are less about national security and more about explicit patriarchy. Dramas have emerged focussing on the 'supreme heroine' who is seemingly independent and empowered by economic growth to engage in self-improvement and self-development. Yet her success ultimately requires intervention by a powerful man.

Cinderella revamp

For example, the show *The First Half of My Life* is about a woman married to a successful executive who enjoys life as a housewife and conspicuous consumer. He cheats on her, the marriage ends, and she loses everything, propelling her to become a successful career woman – made possible in part by another man. "The paradox is that she succeeds because of the help of her new boyfriend, who is even richer than her ex-husband," he said.

Along the same lines is the female character who is modest in appearance and achievement, but attracts the attentions of a powerful, wealthy man, dubbed by TV fans the 'bossy CEO', who falls madly in love with her and forcefully tells her she must accept his love. The show *Boss and Me* is an example of this. The woman tells her boss she is not a good match for him, then works hard to become a successful businesswoman in her own right. Once that is done, she has proven herself worthy of her husband, so she gives up her career and marries her boss.

"I would summarise the ideology of these dramas as women who behave themselves to deserve the love of powerful men. It's a revamp



DR SONG GENG

Both camps relate gender to the virility of the country, because gender is about how you properly nurture and reproduce the next generation.

of the Cinderella story, it's not new, but it has been packaged around seemingly new gender relations," he said.

The audience reactions to these shows are divided. Some educated women are highly critical, but women of other backgrounds, particularly low-income women in their late 20s and 30s who do not have children, mostly enjoy the shows. "They say this is a fantasy for them, an escape from reality," he said, a response that should make programmers happy.

"Generally, television is regarded as a feminine genre of entertainment," Dr Song said. It has been much less studied compared to film and this, combined with the huge popularity of watching shows on digital platforms, inspired him to write his book.



**Televising Chineseness:
Gender, Nation and Subjectivity**

Author: Song Geng
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