

# INTERVIEWS WITH INDUSTRY LEADERS

## 行業領袖專訪

### AI in Communications

#### 通訊領域的人工智能

Interviewed by: Ms. Agnes Tan | 採訪者：陳國萍女士

A portrait of Professor Paul Y S Cheung, a middle-aged man with dark hair and glasses, wearing a dark suit, white shirt, and patterned tie. He is smiling slightly and looking towards the camera.

#### Professor Paul Y S Cheung

#### 張英相教授

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Professor Paul Y S Cheung is currently honorary professors in Computer Science, and in Electrical & Electronic Engineering at the University of Hong Kong. He joined the University in 1980 and had served in different positions including Dean of Engineering, Associate VP (Research) and Director of Technology Transfer. Although he retired from his full-time positions in 2018, he still teaches “Machine Learning for Business and E-Commerce” and other courses in the “MSc in E-Commerce and Internet Computer program”, which he had served as Program Director since 1999 until his retirement.

### Human Intelligence and Artificial Intelligence

Cheung said, “We know very little about intelligence, and do not know exactly where human intelligence lies in our brain. Human intelligence is definitely more superior than animal intelligence, and some people think it is because humans have languages, but that has been shown to be not true. Many animals have languages of their own, like dolphins, but they communicate in very different ways. For example, they don't write poetry, they don't have a written language, they don't have the means to record it, and they communicate using sounds and body languages, with minimal high-level communication. The kind of intelligence which human beings have is unique. Artificial intelligence is different because it tries to simulate what humans know and do.” When Cheung graduated in 1970 from Imperial College London, artificial intelligence was mostly expert systems, that captures rules and creates rule-based structures, but the ‘intelligence’ in such system is mostly fast search algorithms in making decisions, that is very different from what we now have.

### AI in communications

Cheung believes there are many different aspects to AI in communications. Firstly, there is the telecommunications industry, which is mostly the infrastructure that allows people to communicate, and the contributions of AI in this area are limited. AI can provide smarter traffic routing, dynamic control of networks, more efficient traffic management, and by using data collected, AI can predict the demand and optimize use of limited resources better. This is a form of process control, but not the kind of AI that can be applied to the broad sense of communications. Communications, in a broader sense, are the exchanges of information among people and have a long history of evolution: from written languages in physical writings, to use of electromagnetic waves, to the Internet and mobile networks. But Cheung believes that the media of communication (paper, EM waves and optical fiber etc.), and the technology behind it, are not as important as the content that is communicated. AI is making impact not so much to the infrastructure of telecommunication, but to the content within, because the most important purpose of communication is the transmission of messages and ideas. He said, “True communication is not just facts and information, but also emotions, concepts and ideas, and the purpose of communication is to build relationships among people communicating. All these are important because in our age of technology and AI, we are often ‘blind’ to the message, the meaning and the purpose of its content. ‘We hear but not listen, read but not understand’. For example, how often do we hit the ‘like’ emoji button to a message without even reading its content in WhatsApp or Facebook!”

### The rise of AI

Cheung believes the rise of AI is because of the following factors in the last two decades. First, the amount of data has increased enormously because of the internet, mobile networks and the smart phones. Secondly, humans have developed very powerful devices (GPU and SSD) to store and process this data. Finally, there is the development of AI algorithms and models, as a result of enormous investments

張英相教授現任香港大學電腦科學榮譽教授、電機及電子工程榮譽教授，他於1980年加入香港大學，曾擔任不同職位，包括工程學院院長、港大協理副校長兼技術轉移處處長。雖然他已於2018年從全職職位退休，但他仍然教授「電子商貿及互聯網電腦碩士課程」中的課程，自1999年起擔任該課程的課程主任直至退休。

### 人類智慧與 AI

張教授說：「我們對「智慧」知之甚少，也不知道人類的智慧究竟在大腦的哪個部位。人類的智慧絕對比動物的智慧優勝，有些人認為這是因為人類有語言，但事實證明並非如此。許多動物都有自己的語言，例如海豚，但它們溝通的方式非常不同。例如：它們不會寫詩歌，沒有書面語言，也沒有記錄的方法，它們用聲音和肢體語言來溝通，只有最低限度的高層次溝通。人類所擁有的這種智慧是獨一無二的。人工智能（AI）之所以與眾不同是因為它試圖模擬人類的所知所為。」當張教授於1970年就讀於倫敦帝國學院時，AI多半是專家系統，即擷取規則並建立以規則為基礎的結構，但這類系統的「智慧」多半是快速搜尋演算法來做決定，這與我們現在所擁有的非常不同。

### 通訊領域的 AI

張教授認為 AI 在通訊領域有許多不同的面向。首先是電訊產業，這是讓人們能夠溝通的基礎建設，AI 在這方面的貢獻有限，AI 可以提供更聰明的交通路由，網路的動態控制、更有效率的交通管理，透過收集到的數據，AI 可以預測需求，更好地優化有限資源的使用。這是一種流程控制，但不是廣義的通訊所能應用的 AI。廣義上的通訊是指人與人之間的資訊交換，其演化歷史悠久：從實物書寫的書面語言，到電磁波的使用，再到互聯網和移動網路。但張教授認為，溝通的媒介（紙張、電磁波和光纖等）以及背後的技術，都不如溝通的內容重要。AI 所帶來的衝擊不在於電訊的基礎建設，而是其中的內容，因為通訊最重要的目的就是傳遞訊息與想法。他說：「真正的溝通不只是事實和資訊，有情感、概念和想法，溝通的目的是在溝通的人們之間建立關係。所有這些都很重要，因為在我們這個充滿科技和 AI 的時代，我們常常對訊息、訊息內容的意義和目的『視而不見』。我們『聽而不聞，讀而不懂』。例如：在 WhatsApp 或 Facebook 中，有多少次我們甚至沒有閱讀其內容，就對訊息按下了『讚』的表情符號按鈕！」

### AI 的興起

張教授認為 AI 的興起是源於過去二十年來的以下因素。首先，由於網際網路、行動網路和智慧型手機的出現，數據量大幅增加。其次，人類開發了非常強大的設備（GPU 和 SSD）來儲存和處理這些數據。最後，由於學術界和產業界的龐大投資，AI 演算法和模型也得到了發展。但這不

in academia and in industry. But it's not just the technical aspects, there's also the social aspect. Cheung said, "We live in an age where society is often driven by profits and competitions. So we always want to do things faster, find shortcuts, and achieve most with minimal efforts. That is why the development and use of AI has increased exponentially".

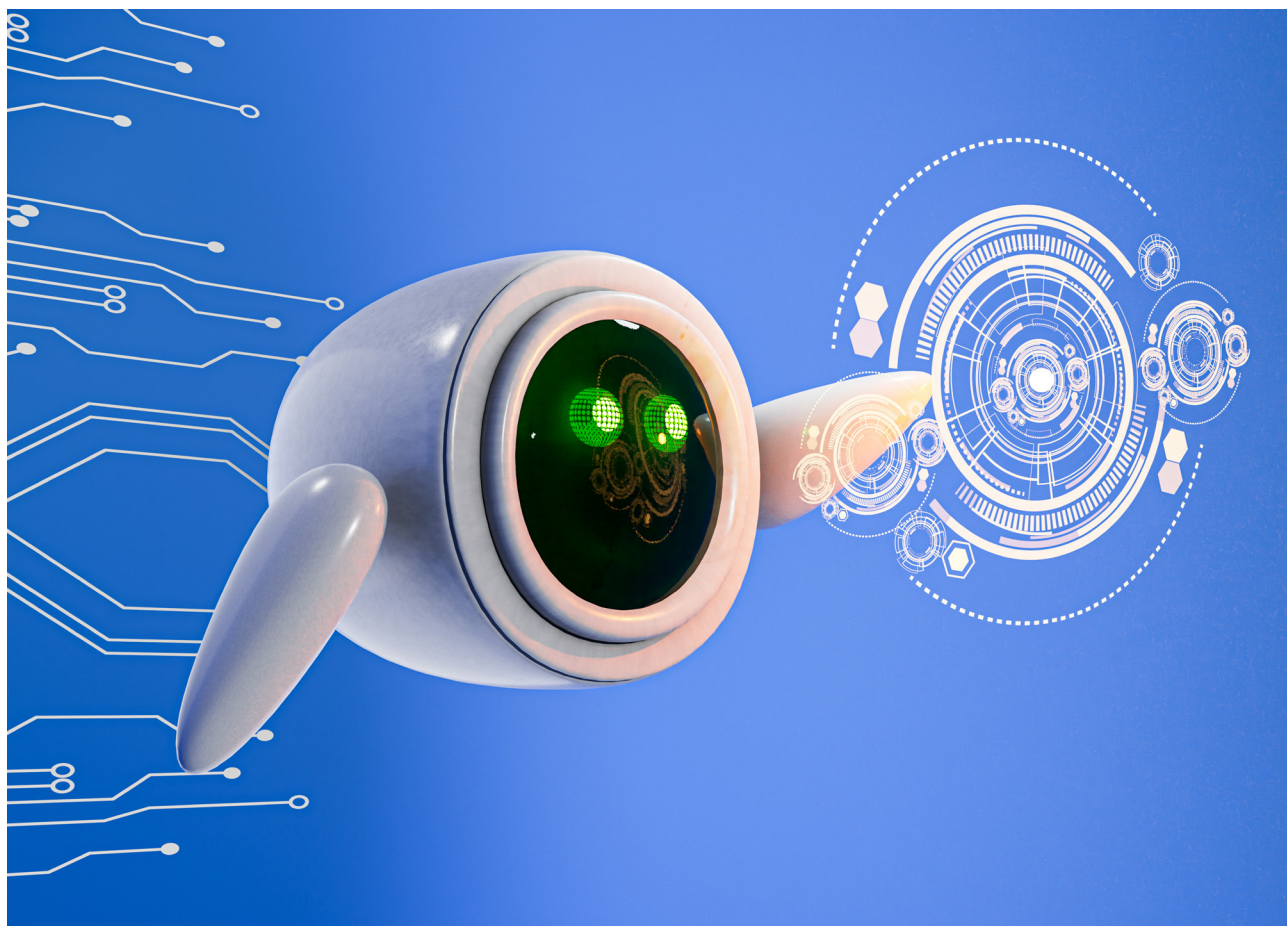
### The "Operator Trap"

Cheung thinks it's important to have a balanced view of AI. He gave the example of the deterioration of our physical bodies throughout history, as humans now in general are physically weaker than our ancestors because of the invention of machines, which led us to evolve from an agricultural society to an industrial society. He believes "if this can happen to our bodies, it will definitely happen to our minds if we are not careful". He called this the "Operator Trap" – AI may turn us all into operators! For example, with the invention of calculators and computers, we become worst in arithmetic and mathematics. AI will accelerate the loss of our ability to think logically, deeply and carefully, which will diminish our being and our humanity. Cheung said, "We need to make AI our tool, not our master. We must think before we use AI to perform tasks for us and ask, 'why we're using it?', 'what we're using it for?', and 'what we can do with the information afterwards?' In this mindful process, we would be able to learn more about the subject and let AI help us to do a better job (AI models also get better in the process too!). In other words, we ourselves 'grow' together with the hidden AI models. This will avoid us becoming 'an operator', and thereby 'a slave' to the AI systems".

只是技術層面，還有社會層面。張教授說：「我們生活在一個社會經常被利潤和競爭驅使的時代。因此，我們總是想把事情做得更快、找到捷徑，以最小的努力達到最大的成果。這就是為什麼 AI 的發展和使用成倍增加的原因。」

### 操作員陷阱


張教授認為對 AI 持平衡的看法很重要。他舉了歷史上我們肉體退化的例子，因為機器的發明，導致我們從農業社會進化到工業社會，所以現在的人類普遍比我們的祖先身體虛弱。他認為：「如果我們的身體可以發生這種情況，那麼如果我們不小心的話，我們的頭腦和心靈也一定會發生這種情況。」他將此稱為「操作員陷阱」(Operator Trap) -- AI 可能會將我們所有人都變成操作者！例如：隨著計算機和電腦的發明我們的算術和數學能力變得最差。AI 將加速我們喪失邏輯、深入與謹慎思考的能力，這將削弱我們的存在與人性。張教授說：「我們需要讓 AI 成為我們的工具，而不是主宰。我們必須在使用 AI 為我們執行任務之前先思考並問：『我們為什麼要使用它？』『我們使用它做什麼？』『我們之後可以用這些資訊做什麼？』在這個用心的過程中，我們將能夠學習到更多關於這個主題的知識，並讓 AI 幫我們做得更好 (AI 模型也會在這個過程中變得更好)。換句話說，我們自己與隱藏的 AI 模型一起『成長』。這將避免我們成為『操作員』，進而成為 AI 系統的『奴隸』」。





### Generative AI in creativity

Cheung believes Generative AI (Gen AI) does not really create. Firstly, he believes the output Gen AI create cannot be considered true creativity. Although humans are influenced by what we learn from other people, we bring our own style (can be novel and unique), thoughts, insights, and feelings to our creative works. AI cannot do that because it can only take snippets of information previously created by humans and combine them into a mosaic of different elements (perhaps with some added randomness!). Secondly, he believes AI does not have emotions and judgements. Although human emotions are influenced by external factors, humans feel, and can exercise ethical, moral and value judgements, whereas AI lacks these faculties. Besides, Gen AI has the risk of biases and hallucinations.

In conclusion, Cheung highlighted the limitations of our understanding of intelligence, emphasized the uniqueness of human intelligence compared to AI, and stressed the importance of content in communication, suggesting that AI can help us to work more efficiently and we may learn and grow with AI. We should develop a balanced approach to the use of AI, encourages us to make AI a tool and avoid becoming its “slaves”. Overall, he calls for a thoughtful and balanced approach to AI, recognizing its limitations while harnessing its potential. In short, he warns us to avoid being turned into an ‘operator’ by what he calls ‘The Operator Trap’ of AI, which in his view, may severely diminish our being and humanity as a whole. 

### 創造力中的 生成式 AI

張教授認為生成式 AI (Gen AI) 並不是真正的創造。首先，他認為 Gen AI 所創造的輸出不能算是真正的創意。雖然人類會受到從其他人身上所學到的影響，但我們會將自己的風格（可以是新穎獨特的）、想法、見解和感受帶入我們的創作作品中。AI 無法做到這一點因為它只能從人類先前創造的資訊片段中，將它們組合成不同元素的馬賽克（也許還會加上一些隨機性）。其次，他認為 AI 沒有情感和判斷力。雖然人類的情緒會受到外在因素的影響，但人類是有感覺的，並且可以行使倫理、道德與價值判斷，而 AI 則缺乏這些能力。此外，Gen AI 有可能出現偏差和幻覺。

最後，張教授強調了我們對智能理解的局限性，強調了人類智能相對於 AI 的獨特性，並強調了內容在溝通中的重要性，提出 AI 可以幫助我們更有效地工作，我們也可能與 AI 一起學習和成長。我們應該發展一種平衡的方法來使用 AI，鼓勵我們將人工智能作為一種工具，避免成為其「奴隸」。總而言之，他呼籲我們以深思熟慮且平衡的方式來使用 AI，在認識到其限制的同時，也要善用其潛力。簡而言之，他警告我們要避免被 AI 的「操作者陷阱」(The Operator Trap) 變成「操作者」，在他看來，這可能會嚴重削弱我們的存在以及整個人類。 