對話世界頂尖學者

Replicable Innovation: Bridging Theory and Real-World Applications

Discussants: Dr. Kwan Min Lee and Dr. Dai-Yun Wu[1]

Editor: Dr. Dai-Yun Wu, Chih-Yun Hsu, and Pin-Wei Cheng[2]

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Dr. Kwan Min Lee   Dr. Dai-Yun Wu

Abstract

In this dialogue, Dr. Kwan Min Lee, with his extensive experience in both academic research and the leadership of communication technology product design, underscores the vital link between academic theory and practical application. He stresses the importance of a deep understanding of inherent human tendencies and technological form factors to drive forward both research and practical advancements in communication technology.

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2. Chih-Yun Hsu and Pin-Wei Cheng are graduate students in the Department of Communication and Technology at National Yang Ming Chiao Tung University.

Additionally, Dr. Lee shares insights from his journey in developing theories related to presence and human-computer interaction, grounded in his understanding of human psychology. He also offers observations and insights on the evolving challenges in the field of communication technology, highlighting areas that require further exploration and study.

Introduction to Dr. Kwan Min Lee

Dr. Kwan Min Lee is the inaugural Korea Foundation Professor in Contemporary Korean Society and New Media and the User Experience (UX) Lab Director at the Wee Kim Wee School of Communication and Information at Nanyang Technological University (NTU), Singapore. Formerly, Lee directed Samsung Electronics' User Experience Group and the Creative Lab (C-Lab) as one of the youngest vice presidents in Samsung's history. He specializes in UX research and design, social and psychological effects of ICT (Information and Communication Technologies), and human-machine interaction. Lee is an elected Fellow of the International Communication Association. His influential works have been widely adopted as major course readings at top academic institutes like Stanford, Penn, and MIT. With over 100 articles and book chapters published in key journals and textbooks across Communication, Human-Computer Interaction, and Psychology, he has made a significant impact in his field. His research findings have been featured in major news outlets such as the Washington Post, BBC News, USA Today, and more, highlighting their relevance and significance.

KML: Kwan Min Lee
DYW: Dai-Yun Wu

DYW：Your achievements are really admirable, with outstanding contributions in both academia and the industry, a feat that few can accomplish. There is a belief that the goals and values of these fields are incompatible. What do you think about this? Could you share your experiences on this matter?

KML：I believe it depends on people's areas of expertise. If you are in an applied science field, applying your theories and studies to real-life products and services is necessary. After all, the primary purpose of conducting studies is to develop theories that can inform real-life decisions, products, and services, so I don't think there's an incompatibility between academia and industry. Instead, they complement each other. There's a saying that good theories are practical. I think this saying applies very well to social science, especially applied social science. Good academic theories in social science are also highly practical in terms of their real-life applications. This is especially relevant in studies related to technology. If we cannot apply our theories of information and communication technologies to real-life technologies, then there's little value in developing those theories.

DYW：In recent years, media technology has been evolving rapidly, with noteworthy advancements occurring every one or two years. Given this dynamic and fast-changing media landscape, from your point of view, how to effectively and meaningfully frame and conduct media technology research?

KML：That's an excellent question. There exists a fundamental distinction between operating within the industry and engaging in academic research. In the industry, particularly when employed by a company, the primary emphasis is not on technological variables[3] that can cut across different products or periods. Instead, the central focus revolves around a product or service and its ongoing enhancement. Each product or service is considered a unified entity, with the objective being the identification of the next major improvement that could transform it into a groundbreaking success.

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3. The term "technological variables" refers to the specific characteristics or elements that make up a technological product or service. These characteristics may include, but are not limited to, screen size, camera pixels, user interface, software features, and so on.

On the contrary, within the realm of academic research, the concern doesn't revolve around the triumph or downfall of a specific product, like the "Apple Vision Pro"[4] which is one of the hottest IT products available on the market now. Academic scholars, in this context, are primarily intrigued by the impacts of particular technological variables, such as screen size or visual fidelity on the success or failure of the product. The aim here is to build a theoretical understanding of the chosen variables. When one technology or product emphasizes screen size while another prioritizes visual fidelity, the goal is to comprehend how these differing emphases on distinct technological factors can profoundly impact the prosperity or failure of each product. Our focus does not limit itself to any one product or service; instead, it perpetually centers around a particular variable or dimension of technology. This is the most significant distinction. Consequently, we do not need to monitor every conceivable variation of brands, technologies, or applications, which would be a formidable task given the constant influx of new technologies, brands, and products. Staying up-to-date and well-informed about technological advancements is pivotal for us, but we do not closely track the evolution of each product or service. Rather, our attention is directed toward the evolution and applications of specific technological variables that define a product or a service. This dichotomy represents a substantial disparity between academic endeavors and industry work.

DYW：Do you see any potential issues or limitations with this holistic view of technology that examines communication technologies as a whole rather than focusing on individual variables?

KML：It depends. Some researchers opt for a holistic approach when examining technologies, which can offer valuable insights. A holistic approach enables us to attain a comprehensive understanding of how a specific technology impacts a

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4. Apple Vision Pro is a mixed reality head-mounted device introduced by Apple Inc. https://www.apple.com/newsroom/2023/06/introducing-apple-vision-pro/

particular context and timeframe. For instance, if your research is centered around investigating the effects of smartphones on adolescents in Taiwan in 2023, employing a holistic approach is crucial. It allows you to gain a clear understanding of how smartphones influence young individuals in Taiwan under current circumstances. However, an important caveat exists. Understanding the impact of smartphones in 2023 doesn't necessarily extend to comprehending their impact two years later. This is because future smartphones will likely incorporate different technological variables or components. In contrast, if your focus is on the influence of specific technological variables that make up a smartphone, your insights into its impact in the current year's smartphones can be applicable to future smartphones, provided that the forthcoming smartphones include the same variable as a component.

DYW：**Expanding on the insights you've shared; could you please provide more detail regarding particular dimensions within the domain of contemporary emerging technology that you think should be explored more extensively or deserve increased attention? For instance, areas such as Augmented Reality (AR), Virtual Reality (VR), or Artificial Intelligence (AI)—can you offer some examples or recommendations for scholars on where to direct their focus?**

KML：In the realm of AR and VR, a persistent concern has revolved around addressing issues such as dizziness and other adverse effects associated with VR devices. Consequently, engineers have explored numerous avenues to mitigate this dizziness, and they have ultimately discovered that much of it arises from discrepancies in sensory signals' timing. When you move your head, but the visual stimuli do not promptly follow this movement, it can lead to feelings of dizziness. Even a slight 0.5-second delay in updating the visual environment can trigger this sensation, as such a delay is not part of our usual visual experience. Thus, reducing latency and achieving seamless synchronization across various sensory inputs has become a central focus of VR research. Now, with innovations like the Vision Pro and new technologies, significant progress has been made in terms of refresh rates and

minimizing asynchrony, bringing us closer to an immersive experience that closely mirrors natural reality. As a result, dizziness is becoming less prominent, and the experience is increasingly natural.

Having addressed this dimension, I believe that enhancing the sense of social presence within virtual environments is the next pivotal challenge. This entails fostering meaningful interactions not only among individuals in the virtual realm but also between those immersed in the virtual world and those existing in the physical world. To achieve this, incorporating features that facilitate social interactions between virtual and real individuals is particularly intriguing. For instance, enabling the conveyance of social cues and eye movements from virtual environments to the physical world is a promising avenue. These technological dimensions are gaining significance and can be aptly termed the "social dimension of technologies."

An intriguing development lies in devices like the Apple Vision Pro, which aims to convey users' eye movements to those in the physical world.[5] This enables seamless social interaction between individuals with and without VR goggles. Looking ahead, there is potential to transcend the current natural social experience and move towards a "hyper-social experience." In this scenario, the device provides enhanced social cues to individuals in their physical environment, enabling richer social interactions with those using the device. People are likely to embrace this kind of technology more extensively because it offers an experience that surpasses the constraints of conventional social interactions.

Consider a situation where such goggle-like devices provide precise directions and cues about others' eye movements. With the assistance of spatial audio or innovative auditory stimuli, you could dynamically adjust your focus on people's

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5. Apple Vision Pro features EyeSight to help users stay connected to those around them. When someone approaches the person wearing Vision Pro, the device appears transparent, allowing the user to see the other person while also showing the user's eyes, providing visual cues to others about what the user is paying attention to. https://www.apple.com/newsroom/2023/06/introducing-apple-vision-pro/

conversations based on the context. Such capabilities would be impossible to achieve in real life, but this device enriches our real-world social interactions. As people increasingly integrate these devices into their lives, they become an extension of our bodies, ultimately enhancing our social interactions. I would refer to this phenomenon as "hyper-social interaction." If technology indeed empowers us to achieve hyper-social interaction in the physical world, the adoption of such devices is poised to increase. From a technological perspective, the study of these social dimensions that facilitate hyper-social experiences will be both fascinating and important in the future.

DYW：That's fascinating! Having gained valuable insights into the importance of the variable-centered approach in communication technology studies, let's now shift our attention to the user dimension. Could you elaborate on why you believe The Media Equation perspective is critical in understanding how media shapes human-computer interaction?

KML：In simple terms, The Media Equation, which is grounded in evolutionary psychology, proposes that experiences mediated through technology are perceived as being on par with real-life experiences. As a result, people react to mediated or simulated objects much like they would to genuine objects (Lee, 2004b; Reeves & Nass, 1996). Initially, the Media Equation perspective may have surprised professionals in the industry. However, today, industry practitioners widely acknowledge the importance of the Media Equation and the CASA (Computers are social actors) paradigm (Nass & Moon, 2000; Reeves & Nass, 1996). While they may not fully grasp the underlying theories, designers and practitioners in the field have internalized and begun applying these principles and rules based on practical experience. It is imperative for human-computer interaction (HCI) designers to adhere to this social interaction paradigm, and it is no longer a novel concept; it is already part of our technological landscape. Many of the products and services we use daily are, in some ways, influenced by this CASA research paradigm.

From the user's standpoint, it is crucial to comprehend this mechanism. Understanding the underlying principles empowers consumers to decipher the intentions of companies or designers, enabling users to make more informed decisions. Large corporations often try to subtly influence our choices through design, even when those decisions seem autonomous. However, with knowledge of these mechanisms, individuals can gain a deeper understanding of their interactions with computers, leading to improved self-control and informed decision-making for themselves and their families. In summary, the application of these theories and principles acts as a positive force for creating a better world and fostering improved human-machine and human-AI interactions in the future. It is of utmost importance for both consumers and producers.

DYW：Your theory of presence has made a profound impact on the field of communication by clearly defining different domains of human experience and providing clear distinctions of physical, social, and self-presence (Lee, 2004a). Could you share with us how the viewpoints or approaches you mentioned earlier are reflected in your theoretical construction of presence?

KML：I explained the mental process of experiencing presence by leveraging insights from evolutionary psychology. My exploration started with an examination of human information processing, the modular nature of the human mind, and the intricate workings of our brains' modular processing systems (as outlined by Lee in 2004a). I proposed that a variety of specialized intelligence modules, such as social intelligence, have evolved to engender automatic responses to specific real-world stimuli and information. Given the human inclination to accept incoming information as credible unless stark evidence suggests otherwise, these deeply ingrained cognitive modules come into play to intercept and regulate the initial reactions of individuals when they are confronted with virtual objects, environments, or humans. Applying this to the understanding of mental processes of feeling presence, I conceived the Cognitive Hijacking Model of Presence (Lee & Jung, 2005). This model seeks to

clarify why we can experience a sense of presence, even when we are conscious of the ontological limitations or the para-authentic or artificial nature of virtual objects, environments, or humans. I postulate that people's innate and social reactions to virtual entities originate from the cognitive hijacking of the general thought process by specialized mind modules. Applying this evolution-based argument to elucidate the mental process of experiencing presence, I contend that using theories from different disciplines such as evolutionary psychology to explain communication phenomena offers us tremendous advantages.

DYW：**Based on your explanation, it is evident that understanding how people react to the form and content of communication technology through the lens of evolutionary psychology is crucial. However, is this the sole principle, or are there additional factors and aspects that should also be taken into account?**

KML：Absolutely, especially in the context of designing products or services with broad appeal. While understanding how our evolutionary psychology shapes our responses to technology is fundamental, it is just one piece of the puzzle. When considering people's everyday interactions with technology, these experiences are shaped by cultural universals, cultural differences, and individual-level distinctions. Each individual has a unique technological experience, making effective design quite challenging. However, when we break down these individual experiences, we find that a significant part of these experiences can be explained by our evolutionary hardwired responses, which are culturally universal tendencies related to technological form factors, and／or social characteristics of technologies. Once you understand these evolutionary hardware responses, you can cater to a larger audience, aligning with our evolutionary inclinations.

Additionally, acknowledging cultural variations and adapting products accordingly allows for the provision of an optimal personalized experience for each individual. However, the design of this ideal experience, tailored to cultural and individual distinctions, should be rooted in our inherent, evolution-driven, culturally

universal tendencies. Consequently, a comprehensive understanding of these cultural universals and our evolutionary predispositions assumes great importance. In summary, the utilization of evolutionary psychology and our ingrained responses to technological form or social factors proves to be immensely valuable.

DYW：Could you please provide us with some examples to illustrate how these principles can be applied in practice?

KML：Certainly. Consider Apple's bounce-back effect, for example. The Apple designers might not have explicitly been aware of the folk physics theory, which posits that both humans and even chimpanzees possess an inherent understanding of how physical objects behave in the real world. Regardless of cultural backgrounds, human infants quickly develop an intuitive grasp of the principles of gravity. This implies that all humans share a built-in understanding of how gravity operates. If a design capitalizes on this innate comprehension, portraying virtual object movements in harmony with the laws of gravity, users from various cultural backgrounds are more likely to find it intuitive. When something feels natural, people tend to perceive it as easy to use. This is one of the reasons why the bounce-back effect proved effective, resonating with users from diverse cultures.

Now, let's delve into the realm of cultural differences. In addition to the bounce-back effect, even something as simple as the direction of object movement can carry distinct interpretations depending on the cultural context. For instance, in cultures where text is read from left to right, rightward movement symbolizes progress, while the reverse holds true in cultures that read from right to left. This means that the same motion can convey different meanings according to culture, significantly impacting the user experience. Hence, the natural movement of virtual objects following the rule of gravity serves as an example of cultural universals, while the directional movement, which can signify either progress or regress, represents an example of cultural differences. Therefore, if your company operates internationally, it is imperative to adapt your design to correspond with not only cultural universals but

also differences.

Furthermore, adding another layer of complexity to interface and user experience design are individual idiosyncrasies. These variations can be shaped by a person's previous technology experiences, demographics, computer proficiency, and even personality traits. Consequently, users may exhibit diverse reactions to the same technology or product. To address this, customization and personalization become critical elements. This is why major interface companies like Apple, Google, and Samsung offer options for personalization. When all three aspects—cultural universals, cultural differences, and individual distinctions—are seamlessly integrated, you can achieve a well-crafted user experience. As I mentioned earlier, it all begins with an understanding of cultural universals and our inherent responses to technological form or social factors.

DYW：There is often a delicate balance to strike in research between addressing practical issues and delivering academic values. How do you suggest scholars navigate this tension effectively to ensure that their work has social impacts while also contributing to the academic body of knowledge?

KML：As I previously mentioned, robust theories find practical applications. By exploring new applications and domains, we can enhance our theories. We can advance our understanding of human-human communication by studying human-machine communication in which even hyper-interpersonal communication or hyper-social interaction can be possible. This, in turn, deepens our comprehension of the fundamental mechanisms underlying human-human communication. To illustrate this concept, consider the analogy of understanding gravity. Grasping the rules of gravity solely through observations within a gravitational environment is challenging. To truly comprehend the power and mechanisms of gravity, one must experience situations devoid of gravity. Similarly, for a deeper understanding of human-to-human communication and interaction, examining scenarios in which typical social interaction is absent can be enlightening. In the past, researchers were constrained to

the study of specific individuals' communication situations, such as those involving individuals with autism, to gain insights into the nature of human social interaction. However, this method had its limitations due to the scarcity of cases available for study.

Now, thanks to technological advancements, researchers can construct virtual environments and manipulate various facets of social interaction. This facilitates a more comprehensive understanding of the mechanisms and significance of each dimension of human-to-human communication. Technology presents substantial opportunities not only for scholars in communication technology but also for traditional orthodox human communication scholars. It is the synergy between practical applications and rigorous academic inquiry that propels our comprehension of communication into uncharted territories, enriches our theoretical framework, and equips us to confront real-world challenges. When theories are applied to address real-life issues across various contexts and domains, they not only deepen our understanding but also undergo more rigorous testing. This approach not only refines our theories but also propels academic progress while simultaneously addressing practical concerns.

DYW：Summarizing the previous discussion, as an accomplished scholar and industry expert in the field of communication technology, what guidance would you offer to researchers in the realm or individuals aspiring to pursue careers in communication technology?

KML：There are several essential considerations to take into account. Firstly, researchers should persist in broadening their comprehension of technological form factors and investigating how these elements influence design across diverse contexts. For instance, acknowledging that the size of an image amplifies its impact on content allows us to apply this knowledge in the design of new products. Furthermore, this insight can be extended to the creation of innovative interior spaces, novel gaming experiences, or even groundbreaking mobility experiences. Through the effective

utilization of these theoretical insights, researchers gain the capability to pinpoint fresh avenues for practical application. For example, by harnessing our understanding of the influence of image size and recognizing the inherent constraints of human peripheral vision fidelity, we can further advance innovative applications. One such breakthrough is the Ambilight TV,[6] particularly in situations where screen size is limited. This concept involves expanding the perceived image by emitting ambient light that corresponds to the colors of the pixels surrounding it, thereby elevating the overall user experience. This stands as a noteworthy demonstration of theory application in novel contexts, resulting in inventive designs that enrich the user experience.

Secondly, there are underutilized technological form factors that harbor significant potential. For instance, incorporating eye contact in both virtual and augmented reality can significantly improve social interaction in both virtual and real worlds, especially since eye contact plays a vital role in facilitating social engagement. Intriguing applications, such as the outward display on Apple Vision Pro,[6] which reveals users' eyes, exemplify this advancement. Technologies like spatial audio and high-fidelity audio also look promising. Tactile interaction is also an area that has yet to be thoroughly explored but will become a critical element of future human-robot interaction.

Many other dimensions await our exploration. As communication scholars, we can apply what we have learned from human-human communication to enhance human-machine interactions. This is an exciting time for communication scholars, given our expertise in communication interaction. As advancements in AI technologies make interactions with machines and robots more natural,

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6. Ambilight is Philips' exclusive patented smart LED that can instantly project the colors on the screen onto the wall or room, making the image seem bigger. https://www.philips.com.tw/c-e/so/tv/ambilight.html

the knowledge we've garnered from studying human-to-human communication becomes more directly applicable to the realm of human-machine communication and interaction. Therefore, I encourage a spirit of adventurous inquiry among communication scholars, as this mindset empowers us to make more substantial changes in both industry and society. Our unique perspectives and insights have the potential to reshape the way humans engage with technology, enriching the user experience and fostering innovative solutions to contemporary challenges.

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可複製的創新：理論洞察的實用體現
Replicable Innovation: Bridging Theory and Real-World Applications

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摘要

　　在這次對談中，Kwan Min Lee 博士根據在個人學術研究以及領導傳播科技產品設計等領域的豐碩經驗，指出學術理論與實務應用之間的密切關聯。他強調深入理解人類固有傾向以及技術形式要素對於推進傳播科技研究和實務進步的重要性，並分享自己根據對人類心理運作機制的理解，發展臨場感以及人機互動相關論述的學術歷程。同時，他也針對傳播科技領域持續發展、且有待進一步探索的重要議題提出了個人的

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觀察與見解。

Kwan Min Lee 博士介紹

　　Kwan Min Lee 博士是新加坡南洋理工大學（NTU）黃金輝傳播與資訊學院講座教授（The Inaugural Korea Foundation Professor），以及使用者經驗（UX）實驗室主任。他曾擔任三星電子使用者經驗組和創意實驗室（C-Lab）總監，是三星企業歷史上最年輕的副總經理之一。他專長於使用者經驗研究與設計、資訊通信技術（ICT）的社會和心理影響以及人機互動領域，曾在傳播、人機互動和心理學等領域的頂尖期刊和教科書中發表逾百篇文章和書籍章節，對相關研究領域做出重大貢獻，並獲選為國際傳播學會會士（ICA Fellow）。其具影響力的研究成果不僅被史丹佛大學、賓州大學和麻省理工學院等頂尖學術機構廣泛採用為重要課程讀物，同時亦曾被《華盛頓郵報》、《BBC 新聞》、《今日美國》等主流新聞媒體報導，顯見其研究成果之影響力。

　　KML: Kwan Min Lee

　　DYW: Dai-Yun Wu

DYW :您在學術界和產業界皆有相當傑出的貢獻，令人佩服，這是很少人能夠做到的。有些人認為產學兩界的目標與價值似不相容，您對此有何看法？能否分享您的經驗？

KML :我認為這因領域而異。如果你處在應用領域，將你的理論和研究應用在現實生活中的產品和服務便是必要的。畢竟進行研究的主要目的，是發展能夠引導現實生活決策、產品和服務的理論，因此我不認為學術和業界之間是衝突的。相反地，它們應該要互補。有一句話說得好，好的理論應該是「實用的」。我認為這句話特別適用於社會科學，社會科學中的優秀學術理論在現實生活應用上也非常實用，在與科技發展相關的研究中尤其如此。若我們不能將我們關於資訊與傳播科技的理論應用在真實生活，那麼發展這些理論就毫無用處。

DYW :近年來，媒體科技發展迅速，每一兩年就會出現值得關注的進展。在這樣瞬息萬變媒體環境之下，您認為應如何有效且有意義地構建和進行媒介科技研究呢？

KML :這是一個很好的問題。在業界工作和在學術環境中進行研究存在著一些根本性的區別。首先，若你在業界公司工作，那麼你可能不大在意那些橫跨不同科技或不同時期的「技術變項」[3]。　相對地，你關注的是產品或服務本身，以及如何讓它持續優化。因此，每項產品和服務都會被視為一個整合的實體（unified entity），目標是找到下一個重大改進，使其獲得突破性的成功。

　　相反地，在學術研究領域內，關注的重點並不在於特定產品的成功或失敗，就好比 Apple Vision Pro[4] 雖為市場上最炙手可熱的資訊科技產品之一，但我們並不特別關心它能否成功。學術研究者真正感興趣的是特定技術變項，例如螢幕尺寸或視覺保真度（visual fidelity），對產品成敗的影響，目標是對所關注的技術變項建立理論性的理解。當某項技術或產品強調螢幕尺寸大小，而另一個產品則重視視覺保真度時，我們的目標是去理解這些對於不同的技術變

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3. 這裡所說的技術變項（technological variables）指的是構成一項科技產品或服務的具體特徵或要素。例如螢幕大小、相機像素、使用介面、軟體功能等。Email: yunerr@nycu.edu.tw

4. Apple Vision Pro 是一款由 Apple 公司推出的混合實境頭戴式設備。https://www.apple.com/newsroom/2023/06/introducing-apple-vision-pro/

項重視將如何深刻影響每個產品的成敗。我們關注的重點持續聚焦在特定技術變項或維度帶來的影響，而不僅限於任何單一產品或服務。這是學術與產業界最顯著的區別。因此，我們不需要時刻監控每個品牌、技術或應用的所有變化；畢竟新技術、品牌和產品不斷推陳出新，要做到這一點將是一項艱巨的任務。對我們而言，保持對最新技術進展的充分了解相當重要，但關注的重點是那些定義產品或服務的特定技術變項的演變與應用。這種區別彰顯了學術研究和產業界工作之間的重大差異。

DYW :**您認為若我們採取整體科技觀（holistic view of technology），也就是將傳播科技產品或服務視為特定整體來進行研究，而非專注於特定變項，會造成哪些潛在問題或侷限？**

KML :這個問題的答案視情況而有所不同。有些研究者選擇在研究科技時採用整體科技觀點，這也可能提供有價值的見解。這樣的觀點能夠讓我們對特定情境與時間範圍內某項傳播科技產品的影響有全面的瞭解。舉例來說，假如你的研究主題是探討 2023 年智慧型手機對台灣青少年的影響，那麼採用整體性的觀點至關重要。它使我們得以清楚地知道智慧型手機在當前的情境下，如何影響台灣的青少年。

然而，需要特別留意的是，瞭解 2023 年智慧型手機的影響，未必能延伸用來理解它在兩年後會帶來什麼影響。因為未來的智慧型手機可能會搭載不同的技術變項。相對的，如果你研究的是智慧型手機採用的某項技術變項所造成的影響，那麼只要未來的智慧型手機仍包含了相同的技術變項，我們當前的研究成果就可以繼續應用到未來情境。

DYW :**基於您分享的觀點，您能否分享在當代新興技術領域內您認為值得更多關注或探索的特定技術變項？例如在擴增實境、虛擬實境、或人工智慧等領域中，您能否為研究者們提供一些例子或建議，指引我們應該關注的面向？**

KML :在擴增實境或虛擬實境領域中，人們長期關注如何減輕設備引發的暈眩和其他不良影響等問題。工程師們嘗試了許多方法來減輕這種暈眩，最終發現其主要源於感知與動作的不同步。當我們移動頭部，但視覺刺激無法即時隨頭部運動產生相應變化時，就可能導致暈眩。即便只是 0.5 秒的視覺環境更新延遲也有

可能觸發這種感受，這是因為這種視覺延遲並不存在我們的日常視覺經驗中。因此，減少延遲並實現不同感官之間的完美同步成為虛擬實境研究的核心焦點。現在，隨著 Apple Vision Pro 這樣的創新技術在更新率和縮減各種感官之間的不同步等面向取得了顯著進展，讓我們的沉浸體驗更接近現實生活中的經驗。因此，解決暈眩已經不再是首要問題，體驗也越來越自然。

在克服了這個問題後，我認為增強虛擬環境內的社會臨場感（social presence）是下一個重要挑戰。這不僅涉及促進虛擬實境中個體之間的互動，更包括了沉浸於虛擬世界中的人們與處在現實世界中的人們彼此之間能進行有意義的互動。為實現此目標，在虛擬實境設備中融入增進虛擬情境個體與真實情境個體之間社交互動的功能尤能吸引人。例如，讓身處虛擬環境的使用者能夠向現實世界的他人傳達視線移動等社交線索就是一個令人期待的發展。這些技術面向變得越來越重要，可稱之為科技的社交面向（social dimension of technologies）。

目前 Apple Vision Pro 設備就有類似的有趣發展，它可以將使用者的視線傳達給現實世界中的人。[5] 因此，佩戴 VR 眼鏡的人和身邊未穿戴設備的人得以無縫進行社交互動。我認為未來甚至將超越自然的社交互動經驗，創造所謂的「超社交互動」（hyper-social interaction）。在超社交互動中，設備提供經強化的社交線索給互動對象，使用者因而得以獲得更優化的社交體驗。我想，在未來會有越來越多的人們使用這種設備，因為它提供了超越自然社交侷限的體驗。

我們可以想像這樣一個情境：類似眼鏡的設備提供有關他人目光方向的精確指引和提示。在空間音頻（spatial audio）或新穎的聽覺感官刺激下，讓使用者可以根據情境動態地調整對特定對話的關注，聚焦在特定資訊。這樣的功能在現實世界中基本上是不可能存在的，但這樣的設備將豐富我們在現實世界中

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5. Apple Vision Pro 具有 EyeSight 功能，可協助使用者與周圍的人保持聯繫。當有人接近佩戴 Vision Pro 的人時，該設備會呈現透明的感覺，除了讓使用者看到其他人，同時也顯示使用者的眼睛，向其他人提供有關使用者所關注內容的視覺提示。https://www.apple.com/newsroom/2023/06/introducing-apple-vision-pro/

的社交互動。隨著人們越來越頻繁使用這些設備，它將成為我們身體的延伸，最終增強我們的社交互動。我把這種現象稱為「超社交互動」。如果未來我們真的能夠在物理世界中實現超社交互動，那麼這類設備的採用勢必大幅增加。從技術角度來看，未來對於促進超社交體驗的這些社交維度的研究將會既迷人又重要。

DYW:太有趣了！在了解傳播科技領域中以技術變項為核心研究觀點的重要性後，現在讓我們再深入談談科技使用者。您能否為我們說明為什麼您認為「媒介等同觀」（The Media Equation perspective）對於理解媒介如何影響人機互動至關重要？

KML:簡單來說，媒體等同觀點根植於演化心理學（evolutionary psychology），主張傳播科技中介體驗與現實生活體驗相當。因此，個人對媒介中介內容或虛擬事物的反應，會類似於與他們在真實世界對事物的反應（Lee, 2004b; Reeves & Nass, 1996）。起初，媒介等同觀點可能讓業界專業人士感到驚奇。但現在，業界從業者普遍認識到媒介等同和 CASA 典範（Computers are social actors；電腦為社會行動者；Nass & Moon, 2000; Reeves & Nass, 1996）的重要性。即便他們可能未完全掌握背後的理論基礎，但該領域的設計師和從業人員皆已在實務經驗中內化並運用這些原則。對人機互動設計師來說，了解並遵循這種社交互動典範非常重要。它已經不再是一個新的概念，而是我們科技景觀中的一部分。我們日常使用的許多產品和服務在某種程度上都受到這種 CASA 研究典範的影響。

從使用者的角度來看，了解這種機制也非常重要。了解這些基本原則使消費者能夠解讀企業和設計師的意圖，讓使用者、消費者能夠做出更明智的決策。大型企業經常試圖透過設計巧妙地影響我們的選擇，即使這些決策看似自主。然而，如果我們了解這些機制，至少可以讓我們更深入地理解自己與電腦、機器之間的互動，從而為自己和家人做出更具自我控制力和明智的決策。總而言之，應用這些理論和原則有助於創造更美好的世界，並在未來促進更好的人機和人工智慧互動。這對消費者和生產者雙方都很重要。

DYW:您提出的臨場感（Presence）理論透過明確界定不同面向的人類經驗，並清

楚定義物理臨場感、社會臨場感和自我臨場感，為傳播領域帶來深遠的影響（Lee, 2004a）。您是否可以與我們分享，您剛才所提到的觀點或方法如何體現於您的臨場感理論建構之中？

KML：我藉由演化心理學的見解來解釋人們體驗臨場感的心理歷程。我的探索始於了解人類的訊息處理方式、人類思維的模組化（modularity）本質，以及大腦模組化處理訊息的複雜運作（見 Lee, 2004b）。我提出人類心智中各種掌控特定領域智能的心智模組，如社交智能，經長久演化，已經發展到能夠對特定的現實世界刺激和資訊產生自動化的反應。有鑑於人類在接收資訊時，傾向於認為所有資訊都是可信的，除非有明顯的反證。因此，當科技使用者面對虛擬事物、環境和人物時，這些根深蒂固的認知模組也會介入並引發使用者自然原始的反應。以上就是我在探討臨場感的心理歷程時提出臨場感的認知劫持模型（Cognitive Hijacking Model of Presence）的基礎（Lee & Jung, 2005）。這個模型旨在解釋我們為什麼會體驗到臨場感——即使我們清楚地意識到我們所互動的虛擬物體、環境、或人物的擬真／人造本質。我認為，人們對虛擬物件和內容做出的自然的和社交性的反應，來自於特定心智模組對思維機制的認知劫持。我認為，使用不同學科的理論來解釋傳播現象，例如應用這個基於演化心理學的觀點來闡明體驗臨場感的心理過程，能為我們帶來許多優勢與好處。

DYW：根據您的解釋，顯然透過演化心理學的視角理解人們如何對傳播科技的形式和內容做出反應是相當重要的。然而，這一原則是否是獨立存在的？還是另外有其他因素或方面也應該納入考慮呢？

KML：當然，特別是在設計具廣泛吸引力之產品或服務情境下。雖然理解演化心理學如何塑造我們對科技的反應是最為基本的，但這只是其中一部分。在考慮人們與科技的日常互動時，這些體驗是由文化普遍性、文化差異性和個人差異所形塑而成。每個人都有獨特的科技使用經驗，這使得發展有效的設計相當具挑戰性。然而，當我們剖析這些個人經驗時，我們會發現，其中很大一部分可以透過我們演化而來的固有反應來解釋，這些反應是與科技形式因素和／或科技的社會面向相關的文化普遍性趨勢。一旦理解了這些演化的固有反應，就可以滿足更廣泛的受眾，與我們的演化傾向保持一致。

除此之外，認知到文化差異並因應不同的文化脈絡調整產品，可以為每個人提供最佳的個性化體驗。然而，這種根據文化和個人差異所量身打造的理想體驗設計，應該建立在我們固有的、受演化驅使的，以及文化普遍趨勢之上。因此，對這些文化普遍性和我們的演化趨勢有更全面的理解就顯得相當重要。也就是說，運用演化心理學，以及我們對科技形式或社會因素的既有反應，被證明是富有高度價值的。

DYW：能否請您為我們提供一些實例，來說明如何在實務上應用這些原則呢？

KML：當然。以 Apple 的回彈效果（Bounce-back Effect）為例。或許 Apple 的設計師並不真的認識所謂常民物理學理論（folk physics theory）——該理論指出人類，甚至黑猩猩，都具備現實世界中物體運動方式的先天知識。無論文化背景為何，人類嬰兒很快就能直覺地的掌握重力原則，這意味著所有人類都對重力的運作有著與生俱來的理解。如果設計產品時能利用這種與生俱來的能力，以符合重力規則的方式呈現虛擬物體的移動，這樣來自不同文化背景的使用者都能直觀地使用它。而當人們對某件事感覺很自然時，往往會認為它更容易使用。這就是回彈效果之所以有效的原因之一，因為它讓不同文化背景的使用者都能產生共鳴。

接著我們來談文化差異。除了回彈效果之外，即使像是物體移動方向這樣簡單的事，都可能會因文化差異而有不同的詮釋。例如，在由左至右閱讀文本的文化情境中，物體向右移動代表著前進；而在由右向左閱讀的文化情境中則相反。這意味著相同的移動方式可能因文化差異而有不同的含義，從而大大影響使用者體驗。因此，遵循重力法則的物體移動是符合文化普遍性的例子，而具有不同意義解讀的物體移動方向則顯示了文化差異。如果你的公司是跨國營運，那麼無可避免的，就必須根據情境調整設計，讓它不僅符合文化普遍性，同時也符合文化差異性。

除此之外，為介面和使用者體驗設計增加另一層複雜度的是個體特性。這些差異可能是由個人過去的科技經驗、人口統計特徵、對電腦的熟練程度，甚至是性格特徵所決定。因此，使用者可能會對相同科技或產品表現出不同的反應。為了應對這個問題，客製化和個人化變得至關重要。這就是為什麼

Apple、Google 和 Samsung 等大公司的使用者介面提供個人化選項的原因。當文化普遍性、文化差異和個人差異這三大面向無縫整合時，就能實現細緻的使用者體驗。正如我之前所提到的，一切都要從瞭解文化普遍性和我們對科技因素與生俱來的反應開始。

DYW：研究工作經常需要在解決實際問題和實現學術價值之間取得微妙的平衡。您建議研究者們如何有效地駕馭這種矛盾，以確保他們的成果既具有社會影響力，又能對學術知識體系作出貢獻呢？

KML：正如我先前提到的，好的理論應具有實際應用價值。透過探索新的應用領域，可以完善我們的理論。我們可以透過研究人機傳播來增進對人際傳播的理解，進而實現「超人際傳播」（hyper-interpersonal communication）和「超社交互動」（hyper-social interaction）。這也將反過來加深我們對於人際傳播背後基本機制的理解。

　　要說明這個概念，我們可以用理解重力來做類比。我們很難僅透過觀察有重力的情境來掌握重力規則。因此，想要真正理解重力機制，人們必須經歷沒有重力的情境。同樣地，為了更深入地理解人與人之間的傳播行為和互動，研究缺乏典型社交互動的情境可能是具有啟發性的。過去，研究人員只能藉由研究特定個體的溝通情境，例如涉及自閉症患者的溝通情境，來深入了解人類社會互動的本質。然而，這種方法由於可研究案例的稀缺而自然存在其侷限性。

　　如今隨著科技的進步，研究人員可以創造模擬環境並操弄社交互動的各個面向。這有助於我們更全面地了解人際傳播間每個面向的機制和意義。科技為我們提供了巨大的機會，這並非僅適用於傳播科技研究學者，同時也適用於傳統的人際溝通研究學者。正是實際應用和嚴謹的學術探索之間的合作，推進我們對傳播未知領域的理解、豐富我們的理論框架，並使我們具備應對現實挑戰的能力。當理論被應用於解決不同情境或領域的實際問題時，除了能深化我們對這些理論的理解，同時也對這些理論進行了更嚴苛的測試。這種方法不僅能完善我們的理論，在解決實務問題的同時更推動了學術的進步。

DYW：總結前面的討論，作為傳播科技領域的傑出學者和業界專家，您對於在這個領域中進行研究的學者，或有志追求傳播科技職業的人有什麼建議？

KML：有幾個關鍵面向需要考慮。首先，研究學者應持續拓展對技術變項的理解，並探索這些因素在不同的情境下如何影響設計。舉例來說，透過理解大螢幕或大尺寸影像能夠強化媒介內容帶來的效果，我們便能將這個知識應用於新產品的設計上。此外，這些洞見還可以延伸應用至創新的室內空間設計、新穎的遊戲體驗，甚至是突破性的行動體驗設計上。透過有效利用這些理論見解，研究者能夠發掘實際應用的新途徑。像是利用我們對影像尺寸效果的理解，以及人類周邊視野保真度的既有限制，就能進一步開發創新應用。例如流光溢彩電視（Ambilight TV）[6]，在螢幕尺寸受限的情況下特別能展現其價值。其設計概念是藉由發射與畫面周邊像素色彩相對應的環境光至牆面來擴展影像範圍，從而提升整體使用者體驗。這是將理論應用於新情境中一個值得關注的例子，理論引導了創新設計，豐富了使用者體驗。

其次，有些尚未被充分討論與探索的科技形式變項也蘊藏著巨大的潛力。例如，在虛擬實境和擴增實境中加入眼神接觸可以顯著改善虛擬和現實世界中的社交互動，尤其是因為眼神接觸在促進社交互動中發揮著至關重要的作用。我認為像 Apple Vision Pro 向外顯示使用者雙眼的創新應用就非常有趣，充分體現了這項進步。其他像是空間音訊（spatial audio）和高保真音訊（high-fidelity audio）看來也很有前景。另外，觸覺互動（tactile interaction）也是一個尚未被深入探索的領域，但將成為未來人機互動的關鍵要素。

當然還有許多其他面向等著我們去探索。作為一名傳播學者，我們可以運用從人際傳播中學到的知識來增強人機互動。鑑於我們在傳播互動方面的專業知識，我認為現在對傳播研究學者來說，是一個令人興奮的時刻。隨著人工智慧技術的進步，人與機器和機器人的互動變得更加自然。而我們從研究人際傳播中獲得的知識，將能直接適用於人機傳播和互動等領域。因此，我鼓勵傳播學者應該要具備冒險探究的精神，因為這種心態能讓我們為產業界和社會帶來更多實質的變革。我們獨特的觀點和見解，具有重塑人類與科技互動方式的潛力，能夠豐富使用者體驗，為當代挑戰發展創新的解決方案。

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6. 流光溢彩電視所搭載的 Ambilight 情境光是飛利浦（Philips）獨家專利，使用智慧 LED 即時將螢幕上的色彩投射到牆上或房間內，讓影像範圍看起來更大。https://www.philips.com.tw/c-e/so/tv/ambilight.html

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