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Probing the limits of Figures and Grounds: Artificial Intelligence and Quantum Computation

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Article abstract

The present article employed McLuhan's figure/ground distinction to probe the boundaries of artificial intelligence (AI) and computation. In popularizing the intellectual tradition of media ecology, Marshall McLuhan warned scholars that confusing the figure (i.e. the content or software) with the ground (i.e. the medium of communication or hardware) would lead to inadequate and incorrect analyses and appraisals of the effects of our media technologies. However, the present article contends that scholars of all stripes are at risk of falling prey to that exact mistake with regards to AI. The present article argues that AI, though having appeared as a touchstone issue in media and communication studies recently, represents the figure, whereas the computational hardware is the ground. Moreover, with continued development of quantum computation technologies, the ground upon which our AI programs rest is in the infantile stages of undergoing a revolutionary change. In sum, this article probes the significance of AI and Quantum computation for the coming decades.

Probing the limits of Figures and Grounds: Artificial Intelligence and Quantum Computation

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Abstract: The present article employed McLuhan's figure/ground distinction to probe the boundaries of artificial intelligence (AI) and computation. In popularizing the intellectual tradition of media ecology, Marshall McLuhan warned scholars that confusing the figure (i.e. the content or software) with the ground (i.e. the medium of communication or hardware) would lead to inadequate and incorrect analyses and appraisals of the effects of our media technologies. However, the present article contends that scholars of all stripes are at risk of falling prey to that exact mistake with regards to AI. The present article argues that AI, though having appeared as a touchstone issue in media and communication studies recently, represents the figure, whereas the computational hardware is the ground. Moreover, with continued development of quantum computation technologies, the ground upon which our AI programs rest is in the infantile stages of undergoing a revolutionary change. In sum, this article probes the significance of AI and Quantum computation for the coming decades.

Keywords: Figure/Ground, Marshall McLuhan, Media Ecology, Artificial Intelligence, Quantum Computation

"One thing about which fish know exactly nothing of is water, since they have no anti-environment which would enable them to perceive the element they live in" – Marshall McLuhan
"By trying to prove ourselves wrong as quickly as possible, we can identify our misconceptions and assumptions, leading us to more accurate and reliable conclusions" – Richard Feynman

Introduction

Although the theoretical roots of artificial intelligence (AI) began in the 1930s and the term AI can be traced to 1956, the recent increases in the sophistication and capabilities of AI, machine learning (ML), and deep learning (DL) programs in the 21st century has generated some mixture of excitement and terror amongst scholars and the public alike (Anyoha, 2017; "Alan Turing," 2024; "History of Artificial Intelligence," 2024; Muthukrishnan et. al, 2020; Tyson & Kikuchi, 2023). AI Programs such as Chat GPT, Character AI, Google Bard, NVIDIA, and several others may have been most popular thus far and served as the figureheads to which most attention – and in some cases, investment – has been made (Glover, 2024; Willing, 2024). However, these applications barely scratch the surface as to what all is out there in regard to AI technology. Regardless of the programs themselves, AI and its subsectors promise to revolutionize retail, finance, education, healthcare, and many other industries (Krislov, 2023; Lohr, 2023; Suleyman, 2023).

However, there is another significant technology developing rapidly and running parallel to artificial intelligence – albeit running much, much more quietly. This technology is quantum computation. With theoretical roots dating back even further than AI (many trace beginnings to the late 19th century), quantum technology is often shrouded in mystery (Simonte & Chen, 2020). Part of this mystery is because quantum computers function in a fundamentally different manner than classical computers – in fact, they actually function on entirely different physical laws (Cuffaro, 2024)! The specifics of this difference, which will be discussed in a future section, are said to eventually be able to result in – or at least what engineers are hoping for – computers that can handle exponentially larger data sets with greater speed and efficiency than classical computers (Stackpole, 2024). Although, the "second quantum revolution" has been declared and the race for "quantum supremacy" is on amongst tech giants, there has been much less scholarly and public attention paid to developments in quantum computation compared to artificial intelligence (Blechler, 2018; Jaeger, 2019). While the lack of attention attributed to developments in quantum computation might aptly be attributed to the theoretical and practical infancy in which it still resides, there may be another less obvious reason…

That reason very well might be what Marshall McLuhan considered to be one of the cardinal sins of media and communication studies: we have focused on the figure and ignored the ground. McLuhan's distinction between the figure (i.e. the content produced by the medium) and the ground (i.e. the technical medium of communication that enables the content) was central to his intellectual thought process and ultimately the development of the field of media ecology (Logan, 2011). For McLuhan, the figure is what appears obvious to us, while the ground is the perceptual and implicit impact of a technology (Miroshnichenko, 2020). McLuhan argued that we are often infatuated with the figures of our environments – the television programs, the shiny ideas, the superficial elements, etc. – so much so that we ignore the degree to which the medium of communication (i.e. the book, the television, the radio, the city, etc.) alters our environment and is precondition, or percept, necessary for the existence of that very figure (Gibson, 2008; Logan, 2019). In digital environments, the line between figure and ground becomes increasingly hard to identify (Adria, 2010; Dowd, 2023; Forsler & Ciccone, 2021). Thus, the task of properly delineating between figure and ground – a precondition to understanding media effects – becomes a much taller task.

Which begs the questions: what are the figures and what are the grounds of our times? Is artificial intelligence the figure, the ground, or some combination of the two? Where do we draw the line? What is the place of computation, classical or quantum, in this relationship? What does our answer to these questions mean for the future of media, communication, and human consciousness? It is exactly these questions which this article will be dedicated to probing.

Definitions and Developments in Artificial Intelligence and Quantum Computation

Prior to getting into the above question, it will be beneficial to delineate between some key terms in artificial intelligence and quantum computation. According to IBM, "artificial intelligence, or AI, is technology that enables computers and machines to simulate human intelligence and problem-solving capabilities" ("What is AI," 2024). Used as an umbrella term, machine learning (ML), deep learning (DL), large language models (LLM), and chatbots are all software programs derived from the overarching conceptualization of AI. For the purposes of this article is not integral to discuss the differences between these applications in depth. Rather, it is sufficient to state that each of these software applications are exactly that: applications. ML, DL, LLM, and chatbots all represent subsets of AI software that simulates human intelligence and activity in a variety of manners. Put another way, AI software takes in data, analyzes it, and puts out some text, image, and/or other activity.

Currently, AI software relies on classical computers to accomplish its work. The materials necessary to construct a classical computer are not standardized device-to-device but often include bauxite, copper, aluminum, zinc, iron, nickel, tin, cadmium, gold, quartz various plastics, and a great number of other raw materials ("National Mining Association," 2024). Once collected, these materials help to craft the main components of a computer including the motherboard, central processing unit (CPU), random access memory (RAM), hard drive, power supply unit, video card(s), sound card(s), and network card ("Inside a Computer," 2024). Put simply, each of these components work together to enable the experience that most individuals in the world are by now familiar with: typing, reading, saving, playing games, surfing the web, etc. When scaled up, they become the supercomputers that power and govern our modern communications networks.

Though the components themselves will be highlighted later on, of greater importance to the present article is the manner in which information is retrieved, stored, and disseminated. As alluded to by the name, classical computers are undergirded by the laws of classical Newtonian physics which posits discrete, deterministic, and binary relations. What this means is that information can be saved via transistors in binary as either a 1 or 0. Information is then stored in bits and bytes, of which each computer has a finite and predetermined amount. This information can then be found and accessed utilizing binary logic gates ("classical computing," 2024). Altogether, classical computing is analogous to a digital filing cabinet: You create a file, put it in a "folder" for safekeeping, and you retrieve the information from that exact spot when needed. And, of course, if you run out of space for your folders, you simply buy another filing cabinet. This process, though scarcely understood in the specific technical terms, is generally comprehensible by specialists and laypersons alike.

Quantum computation offers another option for computation. Construction of quantum computers is quite different than that of classical computers. Though they may use some of the same raw materials, quantum computers are built upon qubits, as opposed to transistors ("What is Quantum Computing," 2024). A qubit can be any bit made out of a quantum system, including electrons, photons, lasers, and artificial or real atoms (Ball, 2024). Put simply, a qubit is the particle that stores and transfers information.

Most importantly, quantum computers function in a fundamentally different manner. Instead of classical Newtonian physics, qubits – and quantum computation processes – are governed by the laws of quantum physics (Williams, 2023). Of primary importance are the phenomena of superposition, entanglement, sum over paths, and tunneling (Kaku, 2023). Superposition refers to the fact that, before measurement, an atom can exist in two states ("Principle of Superposition," 2024). In computing, this means that information can be stored on qubits as both a 1 and zero simultaneously. Entanglement refers to the phenomenon of particles "cohering" to the extent that even when they are physically in different locations they can still influence and communicate with each other ("Entanglement," 2024). Closely related to entanglement is the ability to sum over paths which, according to Kaku (2023), means that "when a particle moves between two points, it sums over all possible paths connecting the two points" (p. 81). Lastly, there is tunneling, which means that particles can "tunnel" straight through barriers that classical bits cannot (Kaku, 2023). Altogether, these four principles are the foundation that allows quantum computers to locate information faster and more efficiently than classical computers.

To confuse the matter further, there are multiple different types of quantum computers still competing to become considered the most viable form. Kaku (2023) outlined 6 different types of quantum computers being developed that are still vying to be considered the most amenable approach which are superconducting, ion trap, photonic, silicon photonic, topological, and D-wave. Superconducting quantum computers built of an elaborate circuit loops cooled to near zero at which point the qubits cohere and display quantum effects (Stancil & Byrd, 2022). Ion trap quantum computers work by stripping atoms of electrons and suspending them in an electromagnetic field causing them to vibrate as coherent qubits which can be manipulated by laser (Holzscheiter, 2002). Photonic quantum computers uses lasers fired at beam splitters and mirrors to manipulate information states (Kaku, 2023). Photons, or particles of light, can be more resilient to decoherence than other qubits which poses opportunities for durability (Ballon, 2023). Silicon Photonic uses preexisting semiconductor chips made of silicon to both transmit light and control flow of electrons to achieve quantum effects (Kaku, 2023). Topological Quantum Computers seek to replicate the spooky topological characteristics of the natural world by using materials (which have yet to be found) that can naturally produce quantum effects (Roy & Di Vinchenzo, 2017). Lastly, d-wave uses some, but not all, principles of quantum computation with a focus on optimization as opposed to complete reworking of computing processes ("D Wave," 2024). If these computers and their processes seem indecipherable, it is for good reason: for most, they simply are. We don't experience the subatomic world perceptually, yet quantum computation is predicated on our control of it. However, this control can only be partial and probabilistic in each. For success, qubits must remain cohered and processes as close to perfect as possible. In all types, this requires a complex physical apparatus that, with the exception of topological, requires zero, true zero temperatures. In sum, quantum computers are highly sophisticated and highly sensitive – both internally and externally – computing systems that offer exponentially more potential than classical computers.

AI software is constrained by what powers it, namely it's hardware. While error reduction in classical computers is more straightforward, classical computers' only avenue to increase their capabilities is linearly by adding more computational power and storage capacity. On the other hand, quantum computers, which have a much higher error rate – due to not only external complexity but external sensitivity – and complex system for correction, increase their power exponentially with each qubit added. In this stage of quantum computers lives, classical computers still appear to hold the advantage of incumbency and the nascent stage of the development of quantum computers renders any claim of quantum superiority hypothetical at best. But as quantum computation continues to develop it poses a fundamental shift in the process of information storage and information retrieval – a shift that may prove to be as or more profound and transformative than the difference between the physical filing cabinet and the classical computer.

McLuhan's Figure and Ground Conceptualization

In an attempt to better understand the relationship between AI and computation, I would like to introduce in slightly more depth McLuhan's conceptualization of the figure and the ground. In typical McLuhanesque fashion, the terms figure/ground were inspired – or "borrowed" as he was wont to do – by the perceptual groupings of figure and background in gestalt psychology (Kastelle, 2014). McLuhan's adaptation aligns the figure with the content of media and the background with the form of the media (Gibson, 2008). For McLuhan the figure is obvious and the ground is hidden. His elaborations on such allowed for a broad conceptualization of what constitutes a figure and what constitutes a ground and was more focused on our perceptions of ground and figure.

To illustrate how this distinction might look in practice let us consider the video game *Pokémon.* As one of the most popular video games of all time, it is available on Gameboy, DS, PC, Nintendo 64, Xbox, PlayStation, and even cell phone application (cite; cite). When we play *Pokémon*, our experience of the characters, the missions, the battles, the visual display, etc. are all components of the figure – it is the obvious component of our technology which we interact with. The hardware enabling it – whether it be a desktop PC, a video game console, a portable Gameboy, or a multi-purpose cellular phone – is the ground which enables the figures to come to life. *This* is the ground to which McLuhan referred; it is the amalgamation of circuitry, buttons, keyboards, headsets, network connections, graphics cards, portability, etc. from which the figure emerges.

Pokémon is just a random example. The important point though is how the hidden ground affects the emergent and obvious figure. Integral to McLuhan's approach to media studies was his insistence that the figure emerged out of the ground (Logan, 2011). Put succinctly by Logan (2011), "The ground provides the context from which the full meaning or significance of the figure emerges" (p. 2). As any gamer will tell you – playing on a PC is not the same as playing on a console or a portable device. As such a medium always carries two inextricable messages for consideration: the content and the form (Logan, 2019). In other words, to investigate issues in media studies – whether dealing with *Pokémon or* Quantum computation – we must investigate both the readily available and obvious outputs of a medium in tandem with the hidden environmental and underlying perceptually biased components of the medium.

Unfortunately, it is important to note that the delineation between figure and ground coupled with the notion that figure and ground are inextricable creates a "blind spot" in human perception. We often confuse the figure for the ground of experience. Gibson (2008) stated that:

> Ambiguity in the figure-ground relation creates a positive-negative sequence *without the possibility of simultaneity*. At the same time, there is on some level an

awareness of the unity of the figures in a total configuration. Discriminating one image/field from the other implies the whole relationship because perception maintains and located the thing to be foregrounded out of the background and then suppresses and hides the background. The shift is a dissociation, one of two phases of a total act of attention in which each stage is complimentary to the other and implies it. When perception constructs the figure on the ground or distinguishes the content from form, the way one object or group of objects is organized as either ground/form or figure/content depends on the direction of attention" (p. 153).

The hefty passage above is included to highlight the notion that in our attempts to distinguish between figure and ground we are engaging in a deeply perceptual act, not an exact surgical procedure – an act that is particularly prone to error in even the most careful and conscientious minds. Moreover, Pugen (2020) argued that:

> Owing to the existential importance of both the abstract cognition of figures (indicative of left-hemispheric perception) and holistic attunement to the ground (indicative of right-hemispheric perception), McLuhan and Powers assert that '[w]hen these hemispheric functions are in true balance, which is rare, "comprehensive awareness" is the result'" (p. 397)

Though there are varying schools of thought here, the left-hemispheric brain is thought to be more analytical, quantitative, and "black-and-white", whereas the right-hemispheric brain is more qualitative, intuitive, and creative (MacNeilage et. al, 2009). "Correct" perception then requires both sensibilities. To see figure and ground as both separate and complete simultaneously requires the merriment of forces traditionally thought to be diametrically (even biologically) opposed.

Altogether, the figure/ground distinction is a perceptual move that delineates and distinguishes between components in an attempt to bring awareness to all of the components. To do so, we rely on both analytic and creative perceptual tools in tandem. Though McLuhan proved to be particularly adept at this mode of consciousness, though this was not readily apparent to all at the time of his writing, nor is it a skill commonly occurring in or outside of the academy today. Any analysis of media via the figure/ground heuristic, must take into account the degree of reliance on human perception. Thus, it is with great reflexivity we must endeavor a figure/ground analysis.

Clarifying and Confusing Figure and Ground – Probing implications for the Future

To bring the above items together, the following section unfolds in the spirit of Marshall McLuhan's primary method: the probe. The probe has been described as a method of perceiving through short, aphoristic, sometimes pithy, and nonlinear interactions with texts, images, etc. (Kuskis, 2011). Oddly enough, the probe is not all too dissimilar to the gedankenexperiment (German for "thought-experiment") used in physics (Barad, 2007). Gedankenexperiments were/are used by theoretical physicists to explore phenomenon for which material testing is not feasible or does not exist. Some gedankenexperiments – such as Schrodinger's Cat – have helped to push the boundaries of their field and have ultimately transformed the field. While this article certainly has no such delusions of grandeur, we risk the probability of being categorically incorrect at the possibility of stumbling upon – or at least stoking the flames of brighter minds to stumble upon – something new.

As a starting point, we will approach the main contention that has been pushed at in this article – namely, that the attention paid to AI is indicative of the human inclination to pay attention to the figure not the ground. This argument is undergirded and contingent upon the following assumptions:

1) That we are able to perceptually delineate between the figure and ground.
2) That we are able to physically demarcate where figure ends and ground begins, or vice versa.

Using the book, the radio, and the television as examples, it seems a simpler task to perceptually make sense of the notion that the programs (i.e. the text, the sound, the moving pictures, etc.) are the figures and the pages, the speaker, and the screen are the grounds. Based on definitions, we may see the demarcation between figure and ground just as simply. Put plainly, software is "the set of instructions, data, or programs used to operate computers and execute specific tasks" ("Software," 2024). Conversely hardware refers to "the computer's tangible components or delivery systems that store and run the written instructions provided by the software" ("What is computer hardware," 2024). Therefore, software is Microsoft Word and hardware is the Toshiba it runs on. It would seem that delineating between software and hardware would be as simple as pressing the power button.

Simple as it may seem, there are a number of moving and subcomponents to both software and hardware. Software – whether system, utility, or application – exists on a number of internal and external levels. Internally software system and utility software is committed to keeping the machine operable. We may be able to press the power button, and the screen may light up, buttons operable, speakers capable of producing sound, but it will be all but useless. In this sense, there is no clean break between software and hardware of computers. We might even find that software, which we have stated is the figure on the ground of hardware, has seemingly become *more* important than hardware in this case.

There is also another societal and/or historical consideration that must be made. As mentioned above, the figure/ground distinction is highly perceptual. It is our experiences with these technologies that informs our approach to them. Which is to say: computers are not sexy anymore – we have one in our pockets at all times. They have receded from attention – they have become environmental and taken for granted. Take the iPhone for example. In its own right, it is a computer. And yet, each new launch is lambasted for providing more of the same insofar as physical features. Advertisements may focus on the improved camera, increased resolution, or some other amplification of existing features, but primarily advertisements focus on what the phone will enable one to do via new programs, applications, etc.. Put another way, it seems that we now find computers so unremarkable to the extent that we are more enthralled by the software. This is different than what McLuhan warned of – which was simply focusing on the figure instead of the ground. Instead, we find ourselves completely uninterested in the ground which once shook up our entire societal organization.

This notion that software/figure might not only be more exciting at present, but also more important to consider might be most apparent in the case of artificial intelligence. Programs such as ChatGPT have emerged as juggernauts in the technological realm. Businesses, universities, and the individuals that each are comprised of have been up in arms as to the reshuffling of societal organization that appears to come along with the maturity of artificial intelligence software. The computers powering artificial intelligence seem to have taken a (perhaps understandably) backseat.

The overlap of systems coupled with the contemporary ubiquity of classical computing may very well have exacerbated the degree to which we have been uninterested in computing hardware. However, quantum computing may shake us to awareness of the importance of computational hardware and infrastructure.

Specifically, there are 5 primary areas in which quantum computation may once again reinstate interest with the ground which are speed, efficiency, accuracy, durability, and storage capacity. Through superposition and entanglement, quantum computers work faster and more efficient than classical computers. In short, if the goal is to get from A to B, quantum chart the shortest course. This is the clearest advantage that quantum computers have – or promise to have – over classical computers. But, as mentioned above, quantum elements are much more fragile to the extent that they are very sensitive to external conditions such as temperature. This notion may also implicate their lack of durability or, more properly, their ability to maintain stability over longer periods of time. Perhaps most significantly, is the manner in which information is stored. By storing information as both a 1 and a zero simultaneously, information storage can increase at an exponential rate with the increase of a single qubit, instead of linearly by bits and bytes. Thus, as engineers figure out how to manage error and external interference and fragility, they can increase computing power at a faster rate and to a more significant degree.

The increased speed, efficiency, and storage of quantum computers, coupled with their fragility may illuminate the importance of computing power as the ground to the software of artificial intelligence. Let us use money as an example. The global economy is managed via classical computers, which to date have proved (to some extent) robust enough to be entrusted with such a task. Individuals conduct personal banking from apps on their phones and e-payments and financial portals on their computers. We have enough trust in the ground, that many engage in financial activities via computer without reservation or consideration. But if the ground becomes quantum we are greeted by a new and mysterious system – one which may garner more or less support. In this case, the ground rushes to the forefront of our consideration in action.

Moreover, we also must consider the variations of quantum computing types. Above we discussed briefly superconducting, ion trap, photonic, silicon photonic, topological, and d-wave quantum computers. Each of these forms are all “quantum” but their form works in a different manner and thus brings with it different advantages, disadvantages, and even spots blind to perception overall.

As we rush to develop these computers, we rush to legislate the impacts of artificial intelligence which may eventually run on them. The European Union has just passed an AI Bill that seeks to provide transparency, levy penalties against high-risk AI, combat discrimination, and define general vs. specific cases where certain types of controversial AI can be used all while stating its commitment to innovation (“AI Act,” 2024). The primary concern undergirding this legislation is that AI can monitor and exploit human activities and disproportionately affect everyday individuals (“EU AI Act,” 2023). The U.S. is working on legislation of their own as well. At its core, the legislation seeks to embrace and encourage increasing the capabilities of artificial intelligence while limiting its uses. What I believe we find here is the legislation of the figure present to us, while the ground is left out of the conversation.

In this sense, we may find quantum computation emerge as anti-environmental. Anti-environment was a term used by McLuhan to discuss that which makes our environments perceptually available to us (Gromova, 2017). For McLuhan, artists were central contributors to the creation of anti-environments. But perhaps we should pay attention a bit more to the physicists and engineers. Quantum computation may have the ability to not only shake us to awareness of the massive infrastructural computing networks that undergird our world, but may also show us new options for the future.

To this last point, it appears that we have reached a point in which computers and their figures are deemed inevitable. This is a point Jaque Ellul bemoaned long before – stating that we always privilege speed and efficiency over all other evaluate criteria when it comes to our technologies (Ellul, 1964). But perhaps it is because we unconsciously have unwavering faith in the infrastructures that have been created underneath them. Shaken confidence in the infrastructure may be just what is needed to cause not just a conversation on legislating uses, but also considering if the capabilities are something we should carefully consider as well. However, the opportunity for “correct perception”, or a balancing of right and left hemispheric functions, may only exist very briefly for our consideration. By carefully paying attention to the development of artificial intelligence software and quantum computation hardware we may be able to address the figure and the ground simultaneously. A feat which would help us truly a future we may feel still has human concerns and interests at the center of.

Concluding thoughts

The above article sought to probe several interrelated concepts including the relation between hardware and software, the differences between classical computation and quantum computation, and the place of the figure and ground in regards to public attention as we head into the future. In doing so, the article traversed the landscapes of computer science, physics, media, law, and economics. As a result, the above scattered exploration of the state of the union between artificial intelligence and computation may provide more confusion than cartography. Still, it is the hope that this article has illuminated some key considerations for the future.

First, it is sincerely hoped that quantum computation is envisioned as a different type of computation, not merely an increase in degree of classical computation. The mechanical structure and processual manner in which data is managed is fundamentally different between classical and quantum computation. This is not a difference that can be relegated to scientific journals, industry-driven technology publications, or the sci-fi dystopic inquisitor. This distinction is important and we all must figure out what to do with it.

Second, there should also be clear impetus to engage in further discussions of the relation of software to hardware and figure to ground. On both fronts, these distinctions are fuzzier than we would like to admit. Though each distinction separates the elements and components, it would appear that they may need to be treated in simultaneity in order to craft accurate pictures of each. It is at different times that hardware or software is foregrounded or backgrounded in our perceptual fields. The computer went from being a plaything for chatrooms, videogames, and pornography, to shaping the global landscape. Quantum computers may be a fun arena of exploration for tech giants like IBM and Google, but soon may represent the next ground of our experience. The ground of quantum computer may supercharge the figure of artificial intelligence. The fragility of quantum systems poses immense risks and opportunities for the future and also preserves the figure/ground distinction in general.

Third, and perhaps most apparent in my writings here, is the degree to which any assessment and plan of the future cannot be purely on ethical, philosophical, or communicative elements of phenomena. The future will require us to try to understand concepts well beyond our grasp. Since we are already behind in both awareness and comprehension – something that was wildly visible to myself as I compiled research for this article – this may be our tallest task to date. We ask our legislators and citizenry to grapple with quantum physics and artificial intelligence. If anything this article was an attempt to confront my own ignorance – I am certainly no theoretical physicist, engineer, or developer – and a plea for others to risk being partially or completely "wrong" – whether in everyday speech with friends or in publications sure to be ripped apart by tenure committees – in the hopes of maybe pushing some modicum of awareness, understanding, and appreciation for unapproached areas of inquiry that may be essential to our mediated environments of the future.

In sum, we return to the epigraph at the beginning of this article. We may be fish in our comfortable waters solely focused on the shiny lure of artificial intelligence that has made a very exciting appearance in our environment. However, something is about to be added to our waters that could fundamentally change the environment – quantum computation. It may simply be that we have swum so far as to approach brackish waters in which these two competing technologies may never completely merge, but instead show the stark contrast of our environment and alert us to changing times. On the other hand, it might simply be a dam that has burst elsewhere engulfing the surrounding towns and creating new underwater cities to that we have yet to swim over to. It might even be an oil spill that threatens to poison our environment and all its contents. We will have to approach the issues as novices, seeking awareness and understanding first, and risk being wrong and ignorant about concepts out of our grasp if we are to get anywhere close to figuring out what is happening. If we approach quantum computation as an anti-environment that allows us to grasp the implications of our human condition at the dawn of massive technological change in the form of artificial intelligence, we may be able to more positively approach and curtail these technologies for human uses. If we do not, we may simply be drowned by the environment we have allowed to be created around us.

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