The Matter of the Mind

Philosophy, Physics, and Music

By

John Teixeira

The Matter of the Mind: Philosophy, Physics, and Music

By John Teixeira

This book first published 2025

Ethics International Press Ltd, UK

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library

Print Book ISBN: 978-1-80441-836-9

eBook ISBN: 978-1-80441-837-6

Table of Contents

For Malu, Jujuba†, and Tâmara

Acknowledgments

This book presents my philosophy of mind. I have been writing and rewriting it for the past twenty years. It would not have been possible without the collaboration of my wife, Maria Luiza Andrade (Malu), who has been the beacon of my life for the past decades. I am immensely grateful to her. I also want to thank my friend and colleague Maria Luiza Iennaco, who read the last draft of this text and collaborated with crucial corrections and suggestions. Many thanks to my friend Osvaldo Pessoa Jr. of the University of São Paulo, who encouraged me to publish this work. I thank my ex-student Monica Aiub for important corrections. I also thank Sarah Palmer from Ethics International Press and Sofia Miguens from the University of Porto, who wrote the foreword.

My soul is like a hidden orchestra; I do not know which instruments grind and play away inside me (…). I can only recognize myself as a symphony.

Fernando Pessoa, *The Book of Disquiet*.

Foreword

John Teixeira is a philosopher of rare breadth who reaches out to large, non-academic audiences interested in the questions of philosophy. Although he sometimes says, provocatively, that philosophy has become irrelevant, he believes in it and makes explicit its pervasiveness in our everyday world. For him, philosophical questions such as what the mind is or what AI is drives our times and societies, and philosophers like Descartes and Kant still count for us. He writes philosophy in a simple and direct style in English and Portuguese. In this book, he articulates his main philosophical convictions, bringing together the many books he has written in Portuguese in the last decades. We thus find the idea that science and philosophy walk hand in hand. We see the relations between matter and mind discussed. We wonder whether we have souls and what we mean by that. We wonder whether machines have minds. We see the paradoxes of mind-body dualism discussed and strange theories such as panpsychism analyzed. We wonder whether we could be zombies and what consciousness, this unique characteristic of our minds, is. We face AI´s wonders and dangers as Chat GPT meets human intelligence. We are confronted with parallels between the nature of mind and the nature of music as we consider time and *qualia*. Along the way, we come across many names from the history of philosophy and science, names of authors we did not know (still) spoke to us and helped us understand better our times: from Plato and Descartes to Isaac Newton, Charles Darwin, and Alan Turing, from William James, Henri Bergson, and Bertrand Russell to Martin Heidegger, Daniel Dennett, and David Chalmers. Even those who are reluctant to see the importance of philosophy will come across their problems and worries about the mind and its relation to the world in this short and rich book by John Teixeira, a philosopher who lives in Sao Paulo, Brazil.

Sofia Miguens, University of Porto – Portugal
November 2024

Introduction

Many people believe philosophy no longer exists or has become useless. But philosophy has never been so present in our lives. If we live in the digital age, this is because science has developed from philosophy. The thinking of past philosophers allowed the digital world to flourish. Their reflections on robots (the automatons at that time) continue influencing our lives today. If we can spend a large part of the day floating in a virtual bubble, and if the internet has become one of the distinctive features of the human ecosystem itself, this is due to the reflection of philosophers such as René Descartes (1596–1650) in the seventeenth century, the naturalist Charles Darwin (1809–1882) in the nineteenth century, and the mathematician Alan Turing (1912–1954) after World War II. Their work underscores the continued relevance of philosophy in the digital age.

Nevertheless, philosophy has lost most of its attractiveness. One of the reasons is the separation between science and philosophy, which has been accentuated since the second half of the last century. This bifurcation, which tends to make science and philosophy incommunicable, is one of the reasons why we live in one of the most anti-philosophical epochs in the history of human knowledge. On the one hand, science believes it can address metaphysical questions previously reserved for philosophy, disregarding the importance of philosophical inquiry in addressing such queries. On the other hand, philosophy rejects positive science, trying to restrict a domain of its own. Consequently, philosophy loses its public space, becoming a specialized academic discipline, and science faces metaphysical problems that it needs to prepare to solve. The urgent need for a unified approach of philosophy and science to produce a comprehensive picture of the world and our place in it is evident.

The influence of positivism, a philosophy championed by French thinker Auguste Comte (1798–1857), has been profound, almost akin to a secular religion for many. According to the positivist doctrine, human knowledge was expected to evolve from a theological stage to a meta-

physical one and eventually reach what Comte termed the positive era. This was envisioned as an era when science would have dispelled all theological and metaphysical issues. However, this prophecy still needs to be confirmed, and positivism has been nearly forgotten.

Thinkers such as Descartes and Turing left crucial philosophical questions as a legacy: What is the mind? Why do matter and mind seem to have incompatible properties? Does the mind survive the death of the body, as many religions defend? Mind and consciousness remain unassailable bastions to knowledge.

These problems have challenged modern science since Descartes explicitly formulated them in the seventeenth century. More than three centuries have passed, and still, there is no way to accommodate something with the properties of mind or consciousness in the scientific picture of the world. The challenge is to know how the brain, the organ that houses our mental activity, can generate ideas, that is, what our thoughts are made of.

As we observe our surroundings, we are confronted with a stark division. On one side, we have the intangible realm of thought, a delicate subjectivity that is fluid, invisible, and ethereal. Conversely, we encounter the solid, opaque world of matter and physics. The question arises: how did seemingly intangible thought emerge from the realm of matter?

Thought results from the brain. So, we are taught. But how can we explain such a variety of thoughts resulting from the same type of electrical signal? How can the same electrical signal generate different thoughts such as "The cat is on the mat" and "Tomorrow will rain"? How can a millimeter path between neurons activated through a synapse generate the experience of traveling thousands of kilometers in a dream? In that case, isn't there a massive disparity between subjective experience and the description of the world as neuroscience does? Or, in other words, how do we explain that the mind exceeds the brain? How does the mind relate to the brain? On the way between neurons and thought, neuroscience does not touch subjective experience to establish a passage that can be described in the objective language of science.

The mind-body problem, a central pillar of the philosophy of mind, has been a subject of intense debate since the time of Plato (428–348 BC), one of the great inventors of philosophy. This enduring enigma, which has captivated the minds of thinkers throughout history, continues to perplex us, cutting orthogonally across Western thought and inviting further, exciting exploration.

After World War II, with the advances in neuroscience, the mind-body problem became the mind-brain problem. The conflict between mental and physical remains camouflaged in many dichotomies, such as nature versus nurture, psychology versus neuroscience, and many others. However, fairly often, upon reflection, its contours become more apparent, and we realize that the hidden conflict is a version of the opposition between the mental and the physical or vice versa.

In this bold book, which transcends the boundaries of pure philosophy or science, I present a possible solution to this stubborn problem. I approach this issue by interweaving a hypothesis drawn from the insights of science, particularly physics, into the rich tapestry of philosophical discourse, inviting readers to engage with a multidisciplinary approach.

When we consider the mind-brain problem, a question arises: What about the mind that cannot be conceived as matter? Since the Modern Age, we have been trying to unravel the nature of the mind and why it is not reducible to matter. Descartes, the great polymath and philosopher of the seventeenth century, stated that the mind is a *res cogitans*, a thinking substance whose properties are incompatible with matter.

The question is to be formulated in opposite terms: what is it about matter that cannot be conceived as a kind of mind? Science can provide a valuable toolkit to deal with such questions – but not classical science, whose roots are in our ordinary visual perception. Why can we not conceive of the universe not using images but, instead, sounds?

A few centuries after Descartes, German physicist Werner Heisenberg (1901–1976), one of the founders of quantum mechanics, stated that the universe is music and not matter. Why could we not propose a matter

theory based on contemporary physics and music? Would it be a key to advancing towards a solution to the mind-brain problem?

Music has had a connection with science and nature that can be traced back to Ancient Greece, where music was taught as a science subject in the Quadrivium university curriculum (music, geometry, arithmetic, and astronomy). Music on Earth was believed to reflect the harmony between the planets. The Renaissance saw Copernicus and Kepler visualize the universe through detailed scientific observations and musical reasoning.

The ancients had a concept called "music of the spheres" that inspired many scientists, especially Johannes Kepler (1571–1630). Because the periodic motion (vibration) of musical instruments causes their sustained tones, the periodic motion of the planets, as they fulfill their orbits, must be accompanied by music. It has never been more than a vague metaphor, so it remains in quotation marks: "Music of the spheres."

Leonardo Da Vinci (1452–1519), a musician, designed the *viola organista*, a semi-automated musical instrument. An excellent flute player himself, Galileo Galilei (1564–1642) made scientific contributions through a detailed investigation of musical sounds. Sir Isaac Newton (1643–1627) theorized the correlation between his spectrum of seven colors and the diatonic musical scale. Inspirations from nature have generated many music masterpieces such as Vivaldi's *Four Seasons* (1723), Beethoven's *Pastoral Symphony* (1808), Holst's *The Planets* (1916), Debussy's *La Mer* (1905), and many more. With the invention of sound recording, electronics, and computers, music composers have been able to capture and recreate environmental sounds and invent imaginary sounds of the universe. From the automatic water-operated instrument of the Ancient Greeks to the modern music robots that play in response to changes in the environment, the connection between music, science, and nature has continued into the twenty-first century. The great physicist Albert Einstein was also a fine musician.

The universe has a soundtrack reminiscent of the *Planets* suite, composed by Gustav Holtz (1874–1934) between 1914 and 1916. In this

piece, Holtz uses contrasting melodies and instrumentation to portray the peculiar sound of each planet in the solar system.

What are sounds? Are they corpuscles or atoms? Sounds are not corpuscles. After a ferocious dispute among physicists, the atomic conception of matter was officially and definitively accepted by the end of the nineteenth century. There were serious objections to it. In Modernity, Descartes' theory of the endless divisibility of matter disavowed the idea of the atom. A final dot would not exist after all possible divisions of the matter.

That was the main argument of atomism, whose discussion was re-invoked by the end of the nineteenth century.

The atomic conception of matter has a long history that spans from Ancient Greece to contemporary physics. The central thesis of the atomists is that the universe is composed only of the aggregation of tiny parts, the atoms. They were the most minor portions of matter ever conceivable. Atomists were, in general, materialists, i.e., they believed that the universe was solely composed of one substance: matter. But how could we imagine those tiniest parts of the matter if they were invisible? Matter´s innards would not be knowledgeable.

Ever since the corpuscular view of matter made its way to physics, it has lasted until now. Sounds could be an exception to the atomic conception of matter. If they are waves, and they are matter since they travel below the speed of light, they are closer to the idea of a string conception of matter, for sound waves result from a vibratory activity.

In recent decades, physics has proposed a new conception of matter based on string theory. String theory does not deny that matter can be composed of corpuscles. If we could examine the particles more precisely, we would find that instead of resembling a dot, they have the shape of a loop, minimal and one-dimensional. Instead, atoms and other subatomic particles could result from the vibration of tiny filaments, the strings. The filaments are like an infinitely thin rubber band that vibrates, oscillates, and dances. Matter´s innards are not solid. Corpus-

cles correspond to specific and ephemerous vibrations of strings. String theory adds a new microscopic level, that of the vibrating loop, smaller than atoms, protons, electrons, neutrons, and quarks.

Let us think of the most well-known strings, such as the strings of a harp. Each of these can represent an infinite number of different vibrational patterns. These are the patterns of strings whose peaks and troughs occur at equal spaces and fit between the two fixed supports of the string. Our ears perceive these different vibrational patterns as different musical notes. The different vibratory patterns define different masses and force loads. In other words, the properties of a particle are determined by the specific vibration performed by its inner string. The shorter the wavelength, the higher its energy. Violin strings that are played more vigorously vibrate more intensely, and those that are only lightly played vibrate more gently.

Why not extend this conception of matter to the mind-brain problem? The brain is a biological device constituted by physics' elementary particles. What if such particles vibrate? Could not such vibrations originate the mind? If such vibrations constitute particles, would they not allow an interchange between matter and mind? This is a possible solution for the interaction between mind and matter, let alone the integration of the mental in the scientific view of the universe. The manifest image of the world and the scientific one could be bridged.

Taking string theory as a metaphor and starting point for conceiving the mind-brain problem has an advantage. The conflict between the manifest image of the world and the scientific one can be overcome without being dissolved or reduced from one to the other.

Furthermore, this new conception of matter could provide an innovative perspective on the mind-brain problem. There is no way to go from solid corpuscles, however small, to something as diaphanous and ethereal as the mind.

Everything would alter if mind and matter could be conceived as a variation of the vibrating strings like the other elementary particles. In

this case, the mind-brain problem would undergo a radical change, and string theory could be a handy metaphor for rethinking how matter could relate to the mind. What if mental states could also be determined by specific and ephemerous vibration of strings? Would, in such a case, mind and matter be the same? If the idea of a sound is closer to string theory, a model of mentality is likely to be sonic. Sounds in a specific frequency, like the strings, would be the best manifestation of the mind. Still, sounds arranged as specific frequencies are music.

Mind would be music. Matter, as ascertained by Heisenberg, is also music. The Universe manifests either by matter or by the mind. Although they have different properties and are irreducible from one to the other, they are the continuous murmur produced by strings' vibration. Mind and matter are audible.

As we affirmed at the outset, searching for a model of the mind-brain problem based on string theory reverses the usual direction of our investigations into the philosophy of mind. We can only find the correct answer if we start with the right question. Therefore, the central question of the philosophy of mind is not knowing what the mind is but knowing what matter is. Strangely enough, science has reversed our common-sense conception of matter, but philosophy has not. Philosophy still needs to work on the mind-brain problem because its starting point is our common-sense view of matter. Corpuscular theories of matter can be a dead end.

The gist of this book is that the mind-brain problem is the need for a suggestive metaphor to accommodate/explain how the passage from matter to mind occurs. From this point of view, the mind-brain problem is a cognitive problem waiting for a solution. How can we build a representation of such a passage without breaking away from science?

Contemporary physics can provide such a representation, which can be borrowed from string theory. Strings are unidimensional, massless physical objects. These strings of vibratory energy would have no thickness, only length. The mental and the physical can be viewed as sharing this same constitution, which allows us to conceive of a passage

between mind and matter. One indication that this passage is possible is that when powerful particle accelerators examine the strings, they look like punctiform particles. Matter can be viewed twofold: either as a particle or as a string. This is the way to solve the problem of the passage from matter to mind.

This metaphor is a mental image of the phenomena needing an explanation. I use physics to build it. I borrow the material for such a new metaphor using string theory. String theory is what can render the passage from matter to mind imaginable. Physical objects can be represented as vibratory patterns of strings. And some of them produce the mental. This is not what happens with the traditional corpuscular conception of matter, where the passage from the physical to the mental leads to the postulation of a cognitive/explanatory gap.

This is the doctrine I coined *mild physicalism*. Mild physicalism is a variety of non-reductive physicalism. Mind and matter are different manifestations of the vibration of strings. They have different properties but are not incompatible since both result from the activity of the strings. The image of the string, although abstract, is what allows us to conceive of a *continuum* between mind and matter that would not be possible in the case of a granulated or corpuscular conception of matter.

Mild physicalism does not entail that string theory is the best accurate description of physical reality. String theory does not have to be assumed as the ultimate truth about physical reality. It can be proved incorrect, but this would not affect what is proposed in this book. Newtonian physics is erroneous, but it remains a reliable tool for engineers.

While other physical theories may surpass string theory, I argue that for now, string theory serves as a potent metaphor for comprehending the mind-brain problem in the philosophy of mind. The key message here is the existence of such a metaphor and the potential for a scientific theory, albeit not definitive, to shed light on the mind-brain problem.

In other words, physics can provide us with the best metaphysics. But I am not saying that the mind is the vibration of some string. This would

have to be investigated empirically, which, at the moment, seems almost impossible. String theory can be used as a model for thinking about the passage from the physical to the mental, for both can be conceived as vibrational.

String theory suggests that particles can be compared to observing a propeller rotating so fast that we have the impression of seeing a disk. Similarly, a polygon with millions of sides would be perceived as a circle. String theory shows that solid, impenetrable, point-like particles appear as strands of vibrant energy in a steady stream where they form and dissolve, like ephemeral rugosity in the fabric of space and time. The mental and the physical result from the perception of the activity of such a propeller,

Models and analogies are crucial in expanding our understanding of nature and forging new connections between scientific and philosophical issues. A model attempts to comprehend one thing as if it were another. The absence of models can render the understanding of certain phenomena nearly impossible. At times, models are highly abstract and beyond the grasp of our imagination. This might be the primary challenge in understanding quantum mechanics, which offers an accurate and mathematically sound portrayal of the subatomic physical world but renders the universe almost incomprehensible to common sense.

Adopting string theory as a model to conceive of both matter and mind provides the advantage of no longer requiring an explanation of how a corpuscle can generate mental states. We can think of our entire mental life as an ongoing process that results from the vibration of strings in the brain. They form a rushing river of subjective experiences, whose reverberation creates the impression of the existence of a *self* that endures in time.

The flow of thought is integrated into the flow of the universe, which is in the vibratory activity of the strings unfolding in time. We are profoundly submerged in a universe composed of matter. We are immersed in the continuous vibration of the strings, though our mind creates the illusion that we are separated from the world. This sense

of separation could be due to the ambiguity of our perception, which creates closeness yet simultaneous, unsurpassed distance from our surroundings.

As we shall see later, enactive theories of cognition can provide an answer to this paradox. They privilege the role of the body and its several sensorimotor capabilities and how they happen in a biological, psychological, and cultural context. Contemporary neuroscience is an upside-down Cartesianism where the "mind" is exchanged for the "brain," but it continues to stipulate that it is separable from the body and the environment.

For the enactivists, knowledge is an effective action that allows living beings to survive in a world they produce. Our bodies' self-inaugurating motion generates the illusion, albeit accurate, that an external world exists and that we are not part of it. As we shall see in Chapter 3, self-inaugurating motion is the cognitive genesis of the mind-brain problem.

For traditional theories of cognition, the world is *external* to us, a world that lies before us and that we are not part of. But this is a mistake. We often think we can look at the world from the outside. In so doing, we forget that we are part of the world our perception presents. The difficulty in conceiving ourselves as part of the world and not outside it has led to many philosophical and cognitive issues that have lasted for centuries. The most outstanding is the problem of representation. How do we represent the world outside us? How can we know that our representations are correct?

What is the role of music in mild physicalism? Werner Heisenberg did not live long enough to know about string theory, which was only formulated in the 1980s. However, his statement allows one to imagine strings vibrating incessantly and, more importantly, creating sounds like the strings of a violin when we touch them. The universe is a symphony, perhaps played at a frequency our ears cannot detect. Since matter and mind are made of vibrations, why would they not produce a sound as the strings of a violin do?

Strings vibrate, and as a violin chord, they could, in principle, produce sounds. This analogy can help us with another philosophical problem: the question of *qualia*. Harmonics can provide a mathematical description of the intensity of some kinds of *qualia*.

Sounds are matter. Their speed is below the velocity of light, so they should be classified as matter, although with unique properties.

My defense of the sonic model initially led me to consider neutral monism in the philosophy of mind. However, I ultimately diverged from this position. I now assert that the universe is not a neutral entity but a manifestation of vibrating strings. This led me to adopt physicalism as my philosophy of mind, discarding any form of monism or panpsychism.

Physicalism holds that the natural sciences – physics, chemistry, biology, and other related disciplines – do not provide a complete picture of the world. For physicalists, all that exists are physical entities, such as particles and force fields, and the properties and relationships established between them. Besides, for physicalists, the nearly exotic entities of contemporary physics, such as black holes, white holes, or dark matter, are nothing but figments of imagination. The version of physicalism I defend allows me to reject both reductionism and dualism. Mind cannot be reduced to vibratory strings since it results from such an activity. But this does not mean that mind and matter are incompatible, a position defended by Descartes in the seventeenth century.

Physicalists assert that physics is a fundamental and complete science. A science is considered complete if all its statements can be derived from the laws of that science. Unlike economics, psychology, and biology, which are incomplete and often rely on each other for explanations, physics does not need other sciences to explain phenomena. This self-sufficiency in physics is a crucial tenet of our hypothesis, which is based on string theory, a physical theory.

It's important to distinguish my position of physicalism from materialism. Materialists seek to reduce the mental to physical objects, specifi-

cally the fundamental particles of matter. In contrast, my position as a physicalist does not attempt to reduce the mind to something detectable but rather to something compatible with our physical description of the universe. This unique perspective is what I have termed mild physicalism in this book.

Materialism and physicalism sustain the fact that the matter´s innards are the same, i.e., vibrational chords. However, this is insufficient to assert that physicalism is materialism or defend a reductionist position about the mind.

It's worth noting that the map is not the territory. String theory holds that the material substratum of all manifestations of matter is the same. Each elementary particle comprises a single string, but all strings are identical. The differences between the particles result from their strings having different vibratory patterns. Different elementary particles are notes of the same fundamental string.

According to the classical theory of matter, the differences between fundamental particles were explained due to each particle species being structurally different. This is not the position defended by string theory. Although made of the same material, i.e., strings, physical objects have different properties. A solid and mental table are different, although made of the same vibratory strings. Matter is no longer a dot in space but the transient vibratory energy of strings. The universe is what happens. Besides, the mind is not formless, as sustained by Plato, since it can be imagined in the form of one-dimensional strings.

According to mild physicalism, matter is not only defined as solidity and impenetrability as in classical physics. I can reduce the material of a chair to atoms but not its shape. For the reductionist, a chair is a set of particles. There would be no decisive moment in which this set of particles would become a chair. To explain is to reduce. However, I'm afraid I have to disagree with it because I am not a reductionist.

The chair's format belongs to the manifested image of the universe, and the particles that compound it belong to the scientific image of the

chair. Mild physicalism does not want to dispense with the manifested image of the universe but to reconcile it with the scientific image. We do not stumble on strings but on physical objects that, although made of strings, have a geometric form and can be detected by vision and sight.

Mild physicalism encompasses the findings of physical science, but it is not a scientific theory. It is a comprehensive philosophical theory. Although I use a scientific theory as a model, I do not believe science alone can resolve all aspects of the mind-brain problem. A scientific theory is a set of interconnected hypotheses that should ultimately be linked to some direct or indirect evidence. This is not the method of philosophy, which is not based on experience. Ultimately, philosophy is conceptual analysis and a convincing argument favoring a plausible conjecture.

Mild physicalism aims to reconcile the mind in contemporary physical theories but without considering the ultimate nature of the mental and the physical. We can explain their role in science and philosophy, but not *what they are.* The mind and the brain are in a *continuum* but are not reducible to each other simply because both result from the strings' vibration. As we shall see later, brains have a particular primordial architecture for generating mental states. Such an architecture is unique and cannot be explained simply by its reduction to strings. Such an attempt would be so inappropriate as to explain that "7" is a prime number by its neuronal correlates. Moreover, the need for a brain to produce mental states is our main argument against panpsychism.

Mind and matter may have the same stuff. However, as it was said, it is not because they may share some properties that they may be considered identical. Asserting that mind and matter share some properties does not mean that they are mutually reducible., i.e., that they have to be identical. Reductionism holds that a person's physical and mental characteristics are merely the manifestation of how the particles that make up her body are arranged. Against reductionism, I hold that mind and matter are not the same, although they share a mutual depend-

ence to exist. This is the main idea of non-reducible physicalism or mild physicalism.

The physical and mental worlds are versions of the activity of vibrating strings. This view is incompatible with dualism, except for David Chalmers's naturalistic dualism.

The Australian philosopher David Chalmers (2006) introduced naturalistic dualism, which opened up new perspectives on dualism. There are two substances, but there is no immaterial substance. There are two substances of one materiality entirely different from the other. The mental, because it has a materiality distinct from the physical, has a specific ontology that cannot be reduced to any other.

The originality and cogency of Chalmer´s view is to open the possibility of a duplicity of substances but not that it would necessarily mean a split between the mental and the physical. There can exist two different natural substances, which is why his position is called *naturalistic dualism*. Chalmers hypothesizes that the mental can be considered a new physical entity that has not yet been detected. In other words, Chalmers sustains that the mental would be a physical entity similar to some unique form of matter not yet detected by physics.

I sympathize with Chalmer´s peculiar dualism, which postulates a duality between mind and matter, but not with the idea that the mind would have to be immaterial. However, I reject Chalmer´s position regarding the problem of consciousness, the theory of the *hard problem of consciousness*.

In his seminal work, *The Conscious Mind*, published in 1996, Chalmers profoundly states that the problem of consciousness is not a puzzle that will be solved soon. He argues that understanding conscious experience goes beyond the mere functioning of the brain and necessitates the discovery of the mechanisms that enable cognitive functions such as perception, reasoning, and memory. However, Chalmers cautions that even when neuroscience comprehensively explains the perfor-

mance of all relevant functions of the mind, the "hard problem" of consciousness remains.

The problem of conscious experience is a complex puzzle beyond merely explaining functional performance. Even when all relevant functions are explained, the 'hard problem' of consciousness persists. As Chalmers provocatively asks: Why do experiences accompany the performance of these functions? We can understand how information is discriminated, integrated, and reported, but this does not automatically explain how it is experienced. This is the crux of the problem of consciousness – understanding how and why experience arises in information processing. No cognitive function, no matter how well explained, leads to an explanation of conscious experience. Conscious experience is not logically supervening to its physical basis; in other words, no fact of the world, even at the microphysical level, necessarily implies the production of conscious states.

For Chalmers, conscious states are not logically supervening to physical states: it is perfectly conceivable that there are two physically identical creatures, one of which develops conscious experiences, and the other does not. The paradigmatic example invoked by Chalmers is the plausibility of conceiving some creatures as zombies. In this thought experiment, a zombie is a creature physically identical to me, molecule for molecule. He is also functionally equivalent to me because he can do everything I do. However, I can perfectly conceive that this zombie has no conscious experiences. This zombie may even be a replica of myself, but replicating my physical and functional characteristics does not automatically imply replicating my possibility of having conscious states. The same could be said of a robot that fully replicated my functional possibilities. Therefore, there is nothing to indicate that conscious states are *logically* supervening to physical states or even to specific functional architectures. Conscious states are at most naturally or empirically supervening to physical states, i.e., there is no logical connection between physical basis or functional architecture and consciousness. Consciousness is contingent on its physical basis and is a *supplementary factor*.

Chalmers' view that a complex brain does not always lead to the emergence of a mind is intriguing. At a certain point in evolution, the human brain may have given rise to consciousness, but this does not imply that replicating it, molecule by molecule, will result in the same outcome. This suggests that consciousness was a unique historical occurrence, not a predictable outcome of brain complexity. This uniqueness of consciousness, its emergence as a singular event in the universe's history, is a fascinating aspect of the mind-brain problem.

However, I can't entirely agree with Chalmers that consciousness depends on supplementary factors. A similar problem occurs with life. We have broken down the physical basis of life molecule by molecule, but we still need to learn how to combine them to produce a living being. No additional factor, no *vital elan*, is required to produce life. No *elan vital* is necessary to create consciousness. But we should ask if consciousness supervenes the mind in the first place. Should we buy the hard problem? I doubt it. What would be consciousness? Thinking about thinking, as Aristotle, in Ancient Greece, first conceived?

Chalmers' critique of reductionism paves the way for attacking equally emergent conceptions of the mind. An analogy that helps us understand how the mind can emerge from the brain comes from observing what happens to water. We know that water becomes ice if cooled below zero degrees Celsius. It goes from a liquid to a solid state. The properties of water in the solid state differ from those in the liquid state. Solidity and impenetrability occur in a solid state – properties that are not common to a liquid state. Is "being solid" the result of the alteration of each water atom? It is very likely that to produce solidity, each of the water atoms will have to change. However, "being solid" does not seem to be a property that could be applied individually to each of the atoms of water because it does not seem to make sense to say that "an atom is solid," although each of them contributes to the production of the property "being solid." In this specific sense, solidity is an emergent property of water when transformed into ice.

Chalmers contends that water becomes ice whenever it cools below zero degrees Celsius. However, the emergence of the mind is more complex. It is not always the case that a mind emerges from matter´s complexity. It may emerge or, perhaps, not emerge at all. Emergence, in this case, is contingent, and this contingent nature of emergence is a thought-provoking aspect of the mind-brain problem. Still, if heated, ice can always return to liquid water. As it were a corollary, emergence is a two-way process, adding another layer of complexity to the problem.

Mild physicalism also defends that the emergence of the mind from matter is contingent. An example of such emergence is analogous to the shining of old electric bulbs. The first invented bulbs had a tungsten filament inside. Light emerged from it whenever an electric current crossed the filament. Light does not have the same properties as the filament (nowadays, we know that light is made of massless photons), but without such a filament, it would not be produced.

In this analogy, the energized filament corresponds to the activity of the strings, and the light that is produced corresponds to the mind. Furthermore, old bulbs produce heat as a side effect. If we extend the analogy, heat could be compared to consciousness, i.e., a collateral effect of the bulb's activity. But this is just a wild speculation.

Once emitted by an incandescent filament, light cannot be returned to its originating material. The mental flow, too, is shrouded in this enigma of irreversibility. Even when we recall past events, our mental time does not rewind. As physicist Carlo Rovelli (2023) eloquently put it, time in our thinking is guided because our thinking is an irreversible process. The past and the future, in this context, are distinct entities.

Irreversibility is a distinctive property of the mind. Mental phenomena are irreversible, and physical processes may or may not. Steam can always be reversed to water. However, broken glasses do not become perfectly what they were. A fried egg cannot get back to being raw. This irreversibility is an asymmetry of mental and physical properties, but not an incompatibility. Such an asymmetry signals the possibility of supporting physicalism without reductionism. Physical processes

are, in general, reversible. By being irreversible, mental processes are not reducible to physical ones. Although not reducible to another, they may still be compatible. Furthermore, mental phenomena depend on physical processes. When the bulb´s electricity is switched off, the light ceases. Without matter, there is no mind, and vice versa.

Besides, irreversibility in time also eschews any possibility of a two-way emergentism. The mind cannot be reduced back to the vibration of strings that once produced it. There may be points of no return in the process of emergence, and the mind could be one of them. However, such points of no return may not necessarily be a breakaway from the physical world.

Although massless, the mind can causally determine behavior. Mind, like light, can carry information. Light may carry information defined by its spectrum frequencies. For example, the color of an object is information carried by light. White light from the sun combines many different wavelengths to create "the color white."

The information the mind carries allows us to conceive of mental causation without departing from the laws of physics. Mental causation confronts us with the metaphysical problem inherited from Descartes: how can something immaterial act on something material? How can something as intangible as the meaning of an event or a few words have a causal effect on the brain to the point of modifying it? The neurobiologist António Damásio stated in his work *Descartes´s Error* (2006): "One can die of disgust, in reality, just like in poetry." What may be a banal sadness for some people can trigger severe mental disorders for others. In this variation, sometimes inexplicable, subjectivity manifests itself, taking the form of an unfathomable difference. The lack of a solution to the problem of mental causation led many contemporary philosophers of mind to vigorously criticize Descartes' work and assert that his dualism is untenable.

The problem of mental causation is far from being solved. According to physics, the causal closure of the world implies that we cannot add matter or energy to the universe. Since the amount of energy in the

Universe is constant, when one physical event causes another, there can be no intervention of a mental event, as this would mean an increase in energy that would conflict with this fundamental principle. Nevertheless, if mental states are massless, like light, they can carry information and causally influence behavior without disrupting the principle of the causal closure of the physical world.

However, the problem of mental causation still has aspects that need clarification. Philosophers of mind have yet to accept the solution proposed above unanimously. The challenge remains knowing how nonphysical mental states can contribute causally to the physical world if every physical effect already has a sufficient cause.

Mild physicalism cannot solve the problems posed by mental causation. It cannot entirely bridge the gap between the scientific description of the world and the subjective first-person account. This issue may never be resolved. Some philosophical problems are, like specific mathematical problems, impossible to solve. Nevertheless, mathematics has not been disqualified because it cannot solve these problems. We should think the same about some philosophical questions and understand that neither philosophy nor philosophers are worthless for failing to solve them.

This book needs to be completed. I do not intend to present a definitive solution to the mind-brain problem. I could not explain how string vibration leads to its subjective manifestation in audible *qualia*, although I suggest an analogy between these vibrations and how music is produced. As we have already noted, an analogy is taking one aspect of a concept and reusing it in another context, preserving some of its meaning. The new combination produces novel and effective meanings.

The strength of an analogy derives from its capability of approximating theoretical concepts to images generated by sensory experiences. Such approximations generate entities such as graphs or diagrams that make a physical theory intelligible. For instance, electromagnetic fields cannot be intelligible without some visual components we use to conceive of them. Furthermore, a mathematical formula always carries a visual and

syntactic aspect. This is the task of mild physicalism: generating a visual metaphor that allows us to conceive the passage of matter to the mind.

In the sixth part of his *Meditations on First Philosophy* (1641), Descartes maintained that conceiving and imagining should be separate. The thousand-sided polygon was the typical example of a conceivable but not imaginable geometrical figure. Similarly, the relationship between the mind and the brain in contemporary philosophy of the mind is conceivable but not imaginable. My goal in this book is to turn it into something imaginable using string theory as a metaphor.

I concentrate on the mind-brain problem. I could not discuss other issues on the agenda of contemporary philosophy of mind, such as the problem of personal identity, mental causation, the difference between human and animal minds, and many others, so I have intentionally avoided them. My project is not to present a general theory of mind but to show that contemporary physics can provide a path to reconcile mind and matter.

I apologize to the readers. I am not a physicist. Therefore, my presentation of string theory and how it has evolved over the last decades is simplified and without the use of mathematics. I relied on books aimed at the general public but written by internationally recognized physicists such as Brian Greene, Carlo Rovelli, Marcelo Gleiser, and Michio Kaku. I hope professional physicists forgive my limitations. Still, I hope to have contributed to elucidating the mind-brain problem not only for academic philosophers but also for the non-specialist audience.

Chapter 1

Minds, Machines and Consciousness

So far, we have discussed some theoretical difficulties of the mind-brain problem and suggested how they can be viewed from the perspective of mild physicalism. However, we scarcely approached how these difficulties apply to machines. Do they have a mind? Do they have a consciousness? Are there tests to help us investigate these questions?

As I have already emphasized, I can't entirely agree with the existence of a hard problem of consciousness. A theory of consciousness may not be necessary for elaborating a theory of the mind. Consciousness is not an additional entity supervising the organization of the mind; it is not a separate entity that would generate the subjective experience accompanying our cognitive abilities. It is a built-in cognitive function, albeit irrepresentable, an interface that organizes our mental activities. Without such an organizer, the idea of mind would become unthinkable. In other words, we could only think of the mind with such a unifying function.

Chalmers attacks reductionism, and I agree with him. But there are mental experiments that defy his criticism. Suppose we lived with a humanoid robot for a certain period, a replica whose external appearance was exactly like that of a human being. This robot would live with us, and its behavior would be indistinguishable from any human being. We *didn't know* we were dealing with a robot, not a human being. This means that for a long time, we would be attributing to it the same mental predicates that we usually attribute to a human being, including the ability to develop conscious behaviors and experiences. One day, the robot slips, falls, and hits its head in the bathtub. Its skull ruptures, and instead of finding the brain matter of a human being inside it, we find wires and computer chips. Would it be appropriate *to remove* all the mental predicates that we had been attributing to him until then – mental predicates that equated him to a normal human being? Would

it be appropriate to say, "Well, now that I've found out that you're a robot, then you didn't have mental states or conscious experiences?"

The argument challenges Chalmer´s anti-reductionism. If the robot had never racked its brain, would we continue to consider it a human being indefinitely? Could it be that we would have to consider him a zombie after the re-predication? Would re-predication fail without a consciousness understood as a supplementary factor? If such an additional entity existed, the re-predication would not be possible.

Another series of questions arises when we reflect on Chalmers's notion of supervenience. Does it make sense, after all, to say that consciousness is a further ingredient that supervenes an organism's or system's mental and functional organization? Wouldn't we be facing conceptual confusion here? To what extent is the independence of conscious experience sustainable for an organism's functional organization or physical structure? In other words, can we think of consciousness independently of our cognitive functions? Aren´t they enough to conceive of consciousness?

This is Dennett´s main criticism of the hard problem. Let us take the predicates *of being conscious* and *having health*. In both cases, the attribution of these predicates would not depend on the possibility of explaining the functioning of a specific physical structure of an organism; that is, in both cases, the attribution of these predicates is based on the observation of an overall characteristic of the organism. However, here, we risk sliding from the idea of *a global characteristic* to the notion of an *additional characteristic*. Do we need it? Why not apply Ockham´s razor to it?

There has been scarce progress on the problem of consciousness. Many theories of consciousness exist, but most are flawed and unconvincing. We still need to determine when assigning consciousness to an organism or device is appropriate. The most famous of the tests for consciousness is the Turing Test (1950), originally intended as a test for 'thinking' but sometimes adapted to test for consciousness.

The Turing test's origins can be traced back to Descartes. As early as the seventeenth century, he invented a language-based test to distinguish robots from humans.

Descartes did not believe that a robot could speak like a human being, that is, have the ability to produce meaningful sentences in a dialogue between two or more human beings and to vary the themes that occur, following the spontaneous zigzags that lead from one subject to another. This is the inspiration for Turing´s test.

A machine passes the Turing Test if it can verbally interact with a human judge in a way that is indistinguishable from human interaction. In such a case, it will be judged as thinking. In other words, to know if a computer thinks, it would be enough to talk to it for a long time through a keyboard, and if, at the end of the conversation, it is not possible to conclude whether the interlocutor was a machine or a human being, we can say that it thinks. For Turing, to believe would be to pass this test because, supposedly, all human beings think and pass the test; that is, they are capable of conversing.

Turing envisioned an illustration of his test that he called the Imitation Game. In the Imitation Game, there are three players: a woman (A), a man (B), and an interrogator (C), who can be of any gender. The interrogator is in a separate room from the man and the woman, and his goal is to determine the sex of the other two. Because the interrogator is separated from the others, he knows his partners only by X or Y, and at the end of the game, he has to say X is A (a woman) and Y is B (a man) or vice versa. To determine the sex of X and Y, the interrogator must formulate a battery of questions that will have to be quite tricky since X and Y can lie.

For example, C might start by asking, "Could you tell me the length of your hair?" And then: "What shoe size do you wear?" If Y is indeed a man, he may give an evasive answer and say, "My hair is wavy; the longest strand must be about 20 centimeters." X can also try to disrupt the game by misleading the interrogator with sentences like, "I don't