ON THE HUMAN MIND: FROM PLATO TO HEISENBERG TO DARK ENERGY

Sobre a mente humana: de Platão a Heisenberg e à energia escura

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ABSTRACT.

The topic of the human mind has fascinated scientists and philosophers alike throughout the Millennia. In this article the author expresses his personal view on the nature of the human mind in the context of the body-mind issue. As he looks at this subject matter in retrospective and, more importantly, from the perspective of the future, the author wishes to avoid entering into deep philosophical discussions (for which he is not qualified), opting instead for metaphoric reasoning, grounded in modern physics. In the quest to comprehend the nature of the human mind, the author invokes the concept of dark energy, a novel force from cosmology responsible for the continuous expansion of the universe. In order to illustrate the complexity of the mind-body issue the author examines the phenomenon of time.

Keywords: Plato; Heisenberg; Human Mind; Dark Energy; Phenomenon of Time.

RESUMO.

Há milénios que, muito possivelmente, o tema da mente humana tem vindo a fascinar cientistas e filósofos. Neste artigo, o autor apresenta o seu ponto de vista acerca da natureza da mente humana no contexto da questão corpo-mente. Ao olhar para este assunto retrospectivamente e, o que é mais, na perspectiva do futuro, deseja evitar discussões filosóficas profundas (para as quais não se encontra habilitado), optando pelo raciocínio metafórico, fundamentado na física moderna. Na mira de compreender a natureza da mente humana, invoca o conceito de energia escura, uma nova força cosmológica responsável pela contínua expansão do universo. A fim de ilustrar a complexidade da questão mente-corpo, examina o fenómeno do tempo.

Palavras-chave: Platão; Heisenberg; Mente Humana; Energia Escura; Fenómeno do Tempo.

I. PROLOGUE

When I was drawn to write a piece for the *Future* issue of this journal I took the opportunity to put on paper a few thoughts that had preoccupied me for some time. In keeping with the stated objective of this issue and with my pledge to address a subject which is of equal interest to both the natural sciences and to the humanities, I have picked the topic of the human mind. As is often the case, in order to envisage the future we must first examine the past to understand the origins of ideas and their journey through time. So, how far back in the history of the human mind do we want to go?

I propose to start with Plato (428 BC-348 BC) one of the best known and most widely read scholars from ancient Greece. Together with his teacher, Socrates, and his most famous student, Aristotle, Plato laid the foundations of Western philosophy and science. Critical for my ensuing deliberations is the fact that Plato considered the *human mind* to be separate from the *human body* (Plato 1961).

Two centuries later, the Roman poet and philosopher Lucretius (99 BC-55 BC) penned the famous *De rerum natura* (*On the Nature of Things*), where he tried to explain philosophy and science to a Roman audience. Therein he addresses not only the principles of atomism, but also argues about the human mind. Lucretius identifies in humans *a certain hidden force*, but he stops short of calling it the human mind. For him the universe was guided by *fortuna (chance or fate*) and not by the divine intervention of the traditional Roman deities (Lucretius 1995).

The role of the independent human mind from the writings of Plato and Aristotle was later supplanted by the concept of a guiding Deity in the great monotheistic religions of Judaism, Christianity and Islam.

Meanwhile, the physical sciences (perhaps more appropriately referred to as natural sciences) did see developments unimaginable to the ancient world of the Greeks and the Romans. Yet, over the last two Millennia the natural sciences and the humanities have been drifting further and further apart from where they were in that ancient world. Moreover, the ever-increasing amount of technical details has led to classical teaching subjects such as mathematics, physics, chemistry or biology, now proliferating into numerous sub-domains.

For instance, nowadays a faculty of chemistry might house departments of organic chemistry, inorganic chemistry, physical chemistry, analytical chemistry, biochemistry, photochemistry, structural chemistry, nano chemistry and more. The tendency to specialize deeper and deeper into one chosen field of endeavour continues to this day. I find it deploring that, by the time our PhD students obtain their highest scientific degree, we expect them to know *everything about a little something*. Fortuitously, the English speaking world continues to use the traditional title of PhD or Doctor in Philosophy, etymologically the *love of wisdom*. This should remind us that we must take a holistic, all-inclusive approach to whatever segment of the *real world* we are concerned with. And yes, we still do not know what the fundamental nature of this *real world* is.

II. THE *MIND – BODY* ISSUE

As a molecular spectroscopist with over 50 years of practical experience, I have used many types of electromagnetic radiation, i.e. different forms of light, to study natural phenomena at the interface of physics, chemistry, biology and medicine. So let me have a go at the human mind.

Obviously, any attempt to shed new light on the human mind must raise the question of the nature of the human mind, which in many ways is more a philosophical question than one for physics or medicine. Yet my personal interest in the human mind was not kindled by a philosopher but by a scientist none other than the great physicist Werner Heisenberg (1901-1976). I first met Heisenberg in 1966, when I arrived in Munich as a young postdoctoral Humboldt Fellow.

Fig 1. Professor Heisenberg introduces his Humboldt Fellows to the President of Germany at a reception in the Villa Hammerschmidt (the German White House in Bonn) in July 1966. *Foreground, left to right*: The author, Heinrich Luebke (German President), Werner Heisenberg; *Background*: A number of Humboldt Fellows from the year 1966. Note that whereas Heisenberg and the President had dropped their champagne glasses before the photograph was taken, the young, inexperienced author clings on to his glass (personal photograph).

As can be seen from the photograph in Figure 1, Heisenberg projects more the image of a jovial grandfather rather than that of a severe scientist. Like other great physicists, at this stage in his life he had become interested in philosophy and metaphysics. In his acclaimed book *Physics and Philosophy: The Revolution in Modern Science* Heisenberg emphasizes that: "We must remember that what we

observe is not nature itself, but nature exposed to our method of questioning" (Heisenberg 1958: 28). This squarely puts the onus on the observer and his tools of investigation. As the president of the German Alexander von Humboldt Foundation, a role he took very seriously, Heisenberg every so often convened small groups of Humboldt Fellows to debate interdisciplinary topics, a favourite one being the mind-body theme. These informal discussions, sometimes over pretzels and beer, were attended by a dynamic mix of physical and social scientists, medical doctors and even theologians. The debates and argumentations were always stimulating and lively, yet they inevitably ended in even more questions and yes, in more uncertainty. Heisenberg was a committed Platonist and used the German word *Geist* (best translated as spirit or mind) which he, like Plato before him, regarded as being separate from the physical body.

At this point we must ask ourselves the question: What is this thing, this elusive and enigmatic human mind? Is it real with its own existence or is it only an abstract entity that helps us navigate through the material world? The literature is full of anecdotal and circumstantial testimonies as to its nature, yet there are no hard data or facts. Finding the anatomical seat of the human mind has been unsuccessful nobody has ever seen or touched the mind. It is therefore not surprising that the humanities and the natural sciences have different, often diverging opinions on the nature of the human mind and on the mind-body relationship (Penfield 1975).

Those in the medical profession take a very pragmatic approach by assuming that the brain fully accounts for the mind and that the mind is simply a matter of brain function. However, in spite of major advances in the cognitive neurosciences, our medical colleagues have not been able to tell us how exactly the brain generates the mind or for that matter our consciousness — brains are not conscious, people are. Practicing physicians attribute neurological disorders to some malfunction of the brain, yet they refer to these conditions as *mental diseases*, meaning *diseases of the mind*.

For those who choose a dualistic approach, the human mind must be viewed as a basic element in itself, a medium or soma with a continuing existence. In consensus with Plato, Heisenberg and many other scholars, this author is prepared to look at the human mind more as an immaterial entity, some kind of yet uni-

dentified force or energy which does not originate from the physical brain itself. If one were to accept this hypothesis, then we should be searching for a new force or type of energy not tied to the brain or to any one organ. Unfortunately the laws of physics as we know them today are unable to provide us with a credible source for such a new force or energy. To tackle the mystery of the human mind we need a new realm of physics, something I am confident will be forthcoming in the foreseeable future.

Meanwhile we might want to look for inspiration to our astrophysicist colleagues who are tackling another mystery, the existence of *dark energy,* which together with *dark matter* makes up 95% of the known universe. But what is the dark energy? The short answer is: we don't know (as yet). Nevertheless, science stipulates that energy must have a source and in the world we know and understand this source is either matter or electromagnetic radiation (light waves). Einstein's famous equation $E=mc^2$ teaches us that matter and energy are interchangeable, which became only too obvious in Hiroshima. What astrophysics has demonstrated quite convincingly is that space, even when devoid of all matter and radiation, has a residual energy. This *energy of space,* when considered on a large (cosmic) scale, can generate a force that increases the expansion of our universe. This force or energy is, for lack of a better name, now referred to as *dark energy* and since space is everywhere, it follows that this dark energy is also everywhere.

The precise origin of this dark energy is still unclear. A possible answer might come from a long-standing unsolved problem in science, namely how to reconcile the physics of the very large with the physics of the very small. Einstein's theory of gravity, i.e. general relativity, can explain everything from the movements of planets to the physics of black holes, but it does not apply on the scale of the particles that make up atoms. Quantum mechanics, on the other hand, can explain how these subatomic particles function, but it does not apply on a scale larger than atoms. A combination of the two theories (gravity and quantum mechanics) might allow us to rationalize the dark energy as some sort of *antigravity*. What makes dark energy so enigmatic is that it does not interact with ordinary energy or matter, at least not when we have to rely on our existing tools of investigation. At present there is clearly a gap in our knowledge that needs to be filled, beckoning the advent

of a new physics paradigm. Regardless of the origin or the nature of dark energy, it would be naive to imagine that this force, which fills the space of the entire universe, should have no influence on life on earth including us humans. Thus, with a nod to our astronomer colleagues, we might want to refer to the human mind as the dark energy of the human brain or simply the human dark energy, emphasizing that the term *dark* stands solely for *unknown or undetectable*.

Let me venture one step further to ask: could the human mind be a kind of energy that continues to exist after death? This is a contentious question which I would like to defer to the future and such time as we know more about dark energy. Nevertheless, since dark energy is a universal force that permeates the entire universe it might not be too outlandish to contemplate a conceivable link to the much taunted primordial energy of Prana, Chi and others.

III. A CASE STUDY: TIME A MIND-BODY PROBLEM

Is time something physical and material or is it just a product (fiction) of the human mind, the stuff for poets, artists and philosophers? The phenomenon of time is used by both the humanities and the physical sciences. Time is an abstract notion, for we cannot see it or touch it. Yet to us time is as familiar as it is mysterious. For those in the arts or humanities, the concept of time is generally that of a *time-arrow* where time is the directional connection between the past, present and future. Those in the physical sciences, on the other hand, use time as a fourth dimension, in addition to the three spatial dimensions, length, width and height. In post Einstein physics, time and space represent different aspects of a single building block referred to as *space--time*. The humanities had it right when they added the qualifier *arrow*, since time is both unidirectional and irreversible. But then again, scientists have postulated the existence of wormholes (technically known as Einstein-Rosen bridges) which could provide a conduit through four-dimensional space-time and may theoretically be utilized for travel through space as well as through time. However, wormholes are not a means of travelling back in time, they

are more like shortcuts between different points in space-time, connecting extremely long distances (billions of light years apart), possibly even linking different universes.

There is also the finality of time. Time happens whether we like it or not, time is inevitable. Space, on the other hand, is something we can choose to move through or not. Unlike time, space is bidirectional and reversible. Time and space provide the stage upon which all of our daily activities and all the physical processes take place, yet most people in the street consider time as a given and do not waste any thoughts as to what it really is. The paradox of time is that while it is possible to measure it very precisely, we still do not have a plausible explanation for its physical nature; even scientists dedicated to study time are still at loss when asked to explain. Not surprisingly, the rationalisation of the phenomenon of time is often relegated to the domain of philosophy, yet another example where those in the physical sciences like to pass the buck to the humanities and social sciences.

There is also the question of whether time has always existed, i.e. did it have a beginning, and if so, it then raises the legitimate question of what came before — and further whether it then also has an ending. Today astrophysicists believe that our universe is actually part of a multiverse and that the Big Bang some 13.8 billion years ago, considered by many as the beginning of time in our own universe, was only a moment in the history of this multiverse. In such a multiverse time would have no beginning and no ending.

Again, these are more philosophical than scientific questions and many great minds have explored this issue. Already last century Stephen Hawking, a much praised astrophysicist turned philosopher, wrote an entertaining book on time: *A Short History of Time: From the Big Bang to Black Holes* (Hawking 1988), which quickly became a bestseller and has been translated in many languages. More recently, Sean Carroll, a cosmologist specialized in dark energy and a gifted communicator has taken the quest for the ultimate theory of time to a new level (Carroll 2011). Nevertheless, there are still many open questions and we might have to leave it to future generations to solve the mystery of time. Meanwhile, I suggest we enjoy

time as we know it and put it to good use in both the natural and social sciences, as well as in our everyday endeavours. I also believe that the subject of time makes an excellent topic for small talk at cocktail parties and of course for more serious scientific and philosophical discussions at interdisciplinary meetings.

IV. EPILOGUE

Since this issue of *Biblos* is dedicated to the future, we must not overlook the fact that biological evolution has not stopped, but continues to progress, and furthermore, for better or worse, scientists can now speed it up through genetic manipulations. So we may well wonder, what would we like to see changed or improved in the future? In addition to improving our understanding of the body-mind relationship we might want to use or train our mind (brain) to develop new sensory capabilities. We humans are severely hampered by the limitations of the sensory world in which our minds have to function. We are primarily *audio-visual* and less aware of the world of touch, taste and smell in which other species function. We are oblivious to the electrical or magnetic fields used by some species for orientation and communication: bats rely on ultrasound for echolocation, birds on magnetic fields for migration. Even in our world of sight and sound humans are aware of only minute slivers of the electromagnetic spectrum and even less of the different energy fields in which we function or the different compression frequencies that surge past us through air, water and earth. Perhaps future generations will be able to tap into the reservoir of the universal, yet enigmatic dark energy which ultimately might allow us to enrich the human mind. I wish them Good Luck!

The quest to understand the nature of the human mind clearly requires an effective dialogue between the natural and medical sciences on the one hand and the humanities and social sciences on the other hand. I hope that in this third Millennium both sides will find it beneficial to combine the conceptual and philosophical ideas originally developed in the ancient world of the Greeks and Romans with the achievements of modern science.

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