# TO WHAT EXTENT CAN THE THEORY OF QUANTUM MECHANICS HELP IN UNDERSTANDING THE MIND-BODY PROBLEM?

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## Abstract

It is widely accepted that consciousness at the start of the 20th century was considered mainly in the context of neurology and the mind-body problem belonged to the domain of neuroscience, psychology and philosophy, later broadened by behavioural science and cognitive science. However, these disciplines cannot completely explain the correlation between mental activity and matter.

Chapter one starts by defining the difficulty of determining consciousness. A discussion of how philosophers (such as Descartes, Locke, Dennett and Nagel) attempted to describe this phenomenon leads to the conclusion that firstly, consciousness is indefinable and secondly, it continues to be a challenge for both – philosophy and science – to explain how subjective consciousness fits into the objective world. The following two parts of the chapter focus on the major philosophical theories of the mind-body problem.

In chapter two there is a focus on the mutual relation between philosophy and science, physics in particular. However, this project deals more with the implications of science for the philosophy of mind and mind-body problem than the science itself. The second enquiry of this chapter is to point out the difference in philosophical and scientific understanding of the word ‘substance’ (crucial to the mind-body problem).

Chapter three considers quantum theory, since the relation between mind and body started to be tackled from the completely new point of view, after the philosophers began to assimilate the implications of quantum physics. Firstly, there is a short introduction to quantum theory and the most significant points for philosophy and quantum mechanics issues are provided (such as quantum superposition, the measurement problem or the backward causation). Analysis of three prevailing theories is provided.

This project addresses the contribution of quantum mechanics to the studies of consciousness and matter and examines whether it helps in solving the mind-body problem.

## Declaration

I declare that the work in this thesis was carried out in accordance with the regulations of the University of Gloucestershire and is original except where indicated by specific reference in the text. No part of the thesis has been submitted as part of any other academic award. The thesis has not been presented to any other education institution in the United Kingdom or overseas.

Any views expressed in the thesis are those of the author and in no way represent those of the University.

Signed Date

## Contents

# Introduction

It is widely accepted that consciousness at the start of the 20th century was considered mainly in the context of neurology and the mind-body problem belonged to the domain of neuroscience, psychology and philosophy, later broadened by behavioural science and cognitive science. Although, philosophers and scientists have been concerned with this concept for millennia, since it is

> both the most obvious and the most mysterious feature of our minds. On the one hand, what could be more certain or manifest to each of us that he or she is a subject of experience, an enjoyer of perceptions and sensations, a sufferer of pain, an entertainer of ideas, and a conscious deliberator? One the other hand, what in the world can consciousness be? How can physical bodies in the physical world contain such a phenomenon?[1]

However, these disciplines cannot completely explain the correlation between mental activity and matter. It remains a big challenge to explain how subjective or phenomenal consciousness fits into the objective world. Dualists claim that the mind is separate and distinct from the body, but this gives rise to the problem of their mutual interaction. On the other hand, monists state that subjective mind and objective brain are united behind their appearances. The problem for materialism is to explain how something that appears so different, such as mind and matter, can be identical. A new branch of physics, quantum mechanics, brings fresh insight into the problem. This project's objectives are to review and assess the major philosophical theories of the mind-body problem and to critically examine whether quantum mechanics helps to bring more understanding to the mind-body interaction.

Chapter one starts by defining the difficulty of determining consciousness. While no objective scientific definition seems to be able to capture the essence of this phenomenon, it is still possible to give examples for what tends intuitively to be called consciousness or being conscious. However, explaining the epistemological basis of consciousness highlights major doubts, since all experienced phenomena are private and subjective (and it is impossible to convey someone's private experiences and their

[1] Gregory, R. L. (ed.), *The Oxford Companion to the Mind* (Oxford: Oxford University Press, 1987), p. 160.

qualities to anyone else). From the seventeenth century, philosophers have started to use the term consciousness in a more specific way, making it a central point when thinking about the mind. Firstly, Descartes defines 'thought' as a state of reflexive consciousness and self-awareness and 'conscious experience' as 'everything that takes place within ourselves so that we are aware of it (*nobis consciis*), in so far as it is an object of our awareness (*conscientia*)'.[2] Then John Locke states that consciousness is essential to thought to the same degree as to personal identity and claims that 'we know certainly, by experience, that we sometimes think; and thence draw this infallible consequence, that there is something in us that has a power to think'.[3] Perceptions, sensations, feelings and thoughts have thus become key words when describing mental states. In the twentieth century, theories have arisen in order to put a subjective consciousness into the objective world (meaning: world accessible by science, where two different people have to agree that 2+2 always equals 4), taking the role of the brain functions into account. David Chalmers has distinguished the problem of consciousness between the 'hard' and 'easy' problem.[4] The 'easy' one refers to the objective neurological study of the brain and can be solved by using straightforward scientific method. It explains the role of different kinds of psychological states and their implementation in the brains of different creatures (analysis of pain, vision, memory, and so on). However, it does not give any explanation of all the feelings involved. The 'hard' problem, also identified as 'the explanatory gap' by Joseph Levine, is when we are trying to find the answer to where the feelings are from, how phenomenal consciousness can be explained and why it is 'like something' to be us? [5] It is the gap between what science can tell us and what we most want to explain.

Consciousness is the subject of this project. A discussion of how philosophers (such as Descartes, Locke, Dennett and Nagel) attempted to describe this phenomenon leads to the conclusion that firstly, consciousness is indefinable and secondly, it continues to be a challenge for both – philosophy and science – to explain how subjective consciousness fits into the objective world and how it relates to scientific goings-on in the brain. While the first part of chapter one concerns the indefinability of consciousness and its main features, the following two parts focus on the major philosophical theories of the mind-body problem. In general, theories fall into three main categories: dualist, monist and mysterian. Instead of focusing on the mysterian view that consciousness is a complete mystery and the understanding of this phenomenon is beyond human comprehension, this project

[2] Anscombe, E., Geach, P. T. (ed.), *Descartes. Philosophical Writings* (Norwich: Nelson's University Paperbacks, 1970), p. 183.
[3] Locke, J., *An Essay Concerning Human Understanding* (London: Dent, 1976), p. 37.
[4] Chalmers, D., 'Facing Up to the Problem of Consciousness', *Journal of Consciousness Studies*, 3 (1995) < http://www.imprint.co.uk/chalmers.html> [accessed 20 September 2012].
[5] Levine, J., 'Materialism and Qualia: The Explanatory Gap', *Pacific Philosophical Quarterly*, 64 (1983) < http://www.umass.edu/philosophy/faculty/faculty-pages/levine.htm> [accessed 20 September 2012] (p. 357).

analyses and critically assesses the two prevailing theories of the mind-body problem in the philosophy of mind. These are Cartesian dualism and monism (two kinds of monistic approach are considered: materialism and idealism). Dualism naturally distinguishes subjective features of consciousness from brain activities. However, a problem occurs in how the interaction is possible between the subjective elements and the physical entities present in time and space, and how these subjective elements emerge. On the other hand, the monist theory does not make any distinction between the subjective mind and brain activity. The issue for monism is to explain how mind and brain can be one (or identical) when they appear to be so different.

The evaluation of Descartes' arguments for the existence of separate mind and body results in the conclusion that he rejects empirical knowledge and the majority of reasoning and its results in order to create the foundation of certain knowledge. However his argumentation is not convincing and is mistaken. The critical analysis of the monistic theories (behaviourism, functionalism, identity theory, idealism) produces a more adequate view of the relation between mind and body. The point to draw from in answering the first research question (what are the prevailing theories of the mind-body problem in the philosophy of mind) is underlining the tendency of moving towards a monistic option in the mind-body problem.

Since the second research question critically examines whether quantum mechanics helps to solve the mind-body problem, in chapter two there is a focus on the mutual relation between philosophy and science, physics in particular, because all the largest systems in the history of philosophy (those that have given the beginning for other systems and which also continue to have permanent influence on human thoughts) have arisen from the reflections on scientific discoveries (such as mathematics that formed Plato's system or logic and biology that influenced Aristotle). It does not matter if those reflections are made by people personally involved in scientific discoveries or rather applied to scientific revolution, which took place in their days or epoch directly preceding. In the whole history of philosophy two major tendencies are noticeable. The first is made up of problems concerning life and its sense with reference to the whole of reality. Our resources of knowledge of the world make up the second tendency. Our knowledge is changing constantly, which simply means that philosophy also has to change. Since the recent development of quantum theory has brought a fresh insight into the science, some of the theories of the mind and the body correlation should be reconsidered. However, this project deals more with the implications of science for the philosophy of mind and mind-body problem than the science itself.

Jean Piaget's concept of 'the whole of reality' that illustrates the strict connection of philosophy and science is presented.[6] According to this, philosophy needs some kind of stimulus from outside for its development and verification. What is more, the development of the new science makes it similar to philosophy to a large extent. The new physics deals with the fundamental, deep and the most general aspects and features of reality. On the other hand, Wittgenstein underlines that philosophy can never be a science. He claims that while philosophy 'clarifies the limits of meaningful language', science 'studies the existence or nonexistence of states of affairs'. [7] It looks at not only things that are not scientific facts, but things that cannot even be verified. The ethical propositions show but cannot say; they represent attitude towards the world. In this case, they cannot be explained by the use of scientific method. Nevertheless, philosophy is often inspired by science, such as Wittgenstein's views, which were inspired by mathematical logic.

The second enquiry of this chapter is to point out the difference in philosophical and scientific understanding of the word 'substance' (crucial to the mind-body problem). The meaning of 'substance' for some philosophers (for example: Aristotle, Descartes and Spinoza) is contrasted with the scientific and physical equivalent. An enquiry into what the difference between those meanings is leads to a discussion of possible inadequacies and inaccuracies in interpreting physical events by philosophers and philosophical issues by physicists. However, when methods in the new physics are changing, and as at the advanced level it is becoming more and more speculative, it seems to be becoming even more closely connected with philosophy. It can be a forerunner of a return to the pre-Aristotelian distinction between philosophy as a study of being and physics as an empirical reflection of nature, when the subject of philosophy and physics was identical.

Chapter three considers quantum theory, since the relation between mind and body started to be tackled from the completely new point of view, after the philosophers began to assimilate the implications of quantum physics (for example: quantum superposition or non-locality). Firstly, there is a short introduction to quantum theory and the most significant points for philosophy and quantum mechanics issues are provided (such as quantum superposition, the measurement problem or the backward causation). However, 'it may sound preposterous to imagine that the mathematics of quantum theory has something to say about the nature of human thinking', the project investigates in a further

[6] Piaget, J., *Insights and Illusions of Philosophy* (Oxon: Routledge, 1997), p. 39-47.
[7] Heaton, J., Groves, J., *Wittgenstein For Beginners* (Cambridge: Icon Books, 1994), p. 41.

three sections of chapter three, whether there is any merit in adopting quantum mechanics for the studies of consciousness and matter.[8] Analysis of three prevailing theories is provided. Firstly, Roger Penrose argues that quantum theory can be effectively applied for explaining consciousness.[9] His views are under the strong influence of the nature of creativity, mathematical insight and the idea of a Platonic reality beyond mind and matter. Penrose, as a supporter of physicalism, assumes that all mental processes can be reduced to physical events. This assumption makes up the basis of the relationships between the physical word and the world of consciousness in the ontology he worked out. However, his non-algorithmic mathematical materialism is often criticized to be obscure and lacking in evidence. Similarly, David Hodgson draws on quantum indeterminacy and non-locality to outline a theory of the relationship between mind and brain. He states that mental and physical events are aspects of manifestations of the same events of the brain-mind and there are some discoverable correlations between them. He claims that macro-physical events of neural firings are aspects of micro events in the quantum world, which means that mental events are closer related to quantum events than to the neural firings themselves. Hodgson's idea of co-operating conscious subsystems is based on the view that 'mind and brain are both manifestations of the same underlying reality'.[10] On the other hand, Amit Goswami applies quantum theory of consciousness to the mind-body problem in monistic idealism. Goswami's views on quantum theory and monistic idealism are the combination of the aspects of quantum physics with the mental monist view that there is a living consciousness being which we understand to be physical reality, but in reality it is really an emergent epiphenomenon.[11] Considering Goswami's monistic idealism, the risks of applying the theories chaining together mysticism and New Age with quantum theory and philosophy of mind are underlined. The whole project applies the analytical approach that provides a philosophical methodology. It is used as a structure for testing the coherency of arguments and the validity of quantum mechanics for the philosophy of mind, as well as for collecting and analysing data. The diverse textual sources are empirically verified and theses are tested for their trueness or falsity. The project is interdisciplinary and encompasses the philosophy of mind with the mathematical thesis and theories from the new physics. Thus it combines the examination of empirical and logical knowledge together with more subjective philosophical statements. Systematic analytic thought through textual analysis produces a comprehensive summary of used theories and numerous counter-arguments for the given thesis.

[8] Buchanan, M., 'Quantum Minds', *New Scientist*, 2828 (2011) 34-37 (p. 37).
[9] Penrose, R., *Makroświat, Mikroświat i Ludzki Umysł* (Warszawa: Prószyński i S-ka, 1997), p. 103.
[10] Hodgson, D., *The Mind Matters* (Oxford: Clarendon Press, 1991), p. 381.

[11] Hamilton, C., 'Scientific Proof of the Existence of God. An interview with Amit Goswami', *What is Enlightment?*, 11 (1997) <http://www.enlightennext.org/magazine/j11/goswami.asp> [accessed 15 December 2012].

> The quantum world defies the rules of ordinary logic. Particles routinely occupy two or more places at the same time and do not even have well-defined properties until they are measured. It is all strange, yet true – quantum theory is the most accurate scientific theory ever tested and its mathematics is perfectly suited to the weirdness of the atomic world.[12]

However, a problem occurs in that quantum mechanics is only a theory and it is not clear what influence and consequences it can have for the understanding of minds. Although theoretical, quantum mechanics has initiated a reexamination of the views of brains and bodies so far. It may explain consciousness and give the answers to the age-old metaphysical questions about the relationship and parallelisms of body and mind. On the other hand, it may not. This project addresses the contribution of quantum mechanics to the studies of consciousness and matter and examines whether it helps in solving the mind-body problem.

[12] Buchanan, M., 'Quantum Minds', *New Scientist*, 2828 (2011) 34-37 (p. 37).

# Chapter 1

## 1.1. Consciousness.

Explaining the nature of consciousness and providing its complete definition is one of the most important and perplexing areas of philosophy and science. According to Daniel Dennet,

> Science does not answer all good questions. Neither does philosophy. But for that very reason the phenomena of consciousness […] do not need to be protected from science – or from the sort of demystifying philosophical investigation.[13]

Formulating the epistemological basis of consciousness causes major doubts. Since, defined narrowly, epistemology is the branch of philosophy concerned with the nature and limitations of knowledge and justified beliefs, it is difficult to deal with problems such as defining the necessary and sufficient conditions of knowledge considering a personal inner privacy or absolute and inviolate individuality. The contemporary objective psychology, hard sciences (for example, neurophysiology or physics) and evidence-based medicine contend with epistemological difficulties of explaining consciousness. There is an inner world of a particular consciousness and,

> as long as you can avoid any severe cranial trauma or anesthetist's ministrations, and as long as you can evade sleep, you can peer from this inner world, perhaps reacting to and interacting with the outside world of objective time and space, but all the time remaining distinct from it.[14]

In twenty-first century, consciousness is considered mainly in the context of neurology and the mind-body problem belongs to the domain of neuroscience, psychology and philosophy, broadened by behavioural science and cognitive science. Nevertheless, these disciplines cannot completely explain the correlation between mental activity and matter.

Among the great number of mysteries that mankind has been dealing with from the dawn of time, human consciousness is, as Daniel Dennett states, 'just about the last surviving

[13] Dennett, D. C., *Consciousness Explained* (London: The Penguin Press, 1991), p. 22.
[14] Greenfield, S. A., *Journey to the Centers of the Mind* (New York: W.H. Freeman and Company, 1995), p. 1.

mystery. A mystery is a phenomenon that people do not know how to think about – yet'.[15] Whilst most of the enigmas such as the origin of the universe, phenomenon of time, space and gravity still remain unsolved and the final answer is yet to be found, people have at least learnt the way to think about them, and have developed some definitions and set the ground for discussion about them. Meanwhile, 'regarded from the standpoint of physical science, the most puzzling thing about consciousness (…) is the fact that it exists at all' and attempts to explain the phenomenon of consciousness still encounter a fundamental obstacle, which is a definition of what consciousness actually is.[16]

The indefinability of consciousness causes the major problems in explanation what this phenomenon really is. However, it is still possible to give examples for what tends intuitively to be called consciousness or being conscious. There is a big difference between having a tooth drilled without local anaesthetic and having it drilled with one. The purpose of the anaesthetic is to remove the consciousness of pain. Similarly, there is a difference between having eyes open and closed. When eyes are shut, what disappears is the conscious visual experience. Consciousness can be explained as the difference between being awake and being asleep. However, this is not quite right, because dream experiences (especially in nightmares or fantasies) are conscious too. Consciousness is lost in a dreamless sleep or during a total anaesthetic. The reason for explaining consciousness with examples rather than definitions is that 'no objective, scientific definition seems able to capture the essence of consciousness'.[17]

Originally, the term 'consciousness' refers to awareness and knowledge, and represents the sense of experiencing something: the sense of the presence or the occurring of something in the field of its inner perception.[18] However, in common use the word 'consciousness' bears a lot of meanings: we can lose and regain consciousness; be conscious of one's appearance; or take conscious decisions. It can be equated to the light – it exposes something, brings it out the darkness of unconsciousness and has different levels of intensity or range. There is also 'stream of consciousness' – the sequence of the states that the self realises and the acts belonging to a particular self. There is also self-consciousness (the awareness of oneself as an individual), or being a part of a certain socio-economic class builds a particular class-consciousness. In the realm of spiritual

[15] Dennett, D. C., *Consciousness Explained* (London: The Penguin Press, 1991), p. 21.

[16] Lockwood, M., *Mind, Brain and the Quantum* (Oxford: Blackwell, 1991), p. 1.
[17] Papineau, D., Selina, H., *Introducing Consciousness* (Cambridge: Icon Books, 2000), p. 6.
[18] Frankish, K., *Consciousness* (Milton Keynes: The Open University, 2005), p. 1-2.

development, a number consciousness rising activities are known, leading to 'pure consciousness' as a state of mental awareness devoid of all particular content. Some drugs alter our perception in the way we have a subjective sensation of our consciousness being enhanced or broadened.[19] Consciousness can have an active character (for example: the act of cognition, the act of decision or the act of imagining something) or a non-active character (such as moods or passive sensations).

It was back in the seventeenth century that philosophers started to use the term in a more specific way, making consciousness a central point when thinking about the mind. Perceptions, sensations, feelings and thoughts have now become key words when describing mental states. In his *Principles of Philosophy*, Descartes wrote: 'By the term 'thought' (*cogitato*, *pensée*) I comprehend all that in us, so that we are immediately conscious of it. Thus, all the operations of the will, intellect, imagination, and senses, are thoughts'.[20] Thus he defined 'thought' as a state of reflexive consciousness and self-awareness. The notion of that phenomenon was later expanded by John Locke, who stated that consciousness is essential to thought to the same degree as to personal identity. In *An Essay on Human Understanding* he goes onto say

> I do not say, there is no soul in man because he is not sensible of it in his sleep; but I do say, he cannot think at any time, waking, or sleeping, without being sensible of it. Our being sensible of it is not necessary to any thing but our thoughts; and to them it is, and to them it always will be, necessary, till we can think without being conscious of it. […] I grant that the soul in a waking man is never without thought, because it is the condition of being awake; but whether sleeping without dreaming be not as affection of the whole man, mind as well as body, may be worth a waking man's consideration; it being hard to conceive that any thing should think and not be conscious of it.[21]

The focus of interest for the philosophers at that time was not the nature of those mental states per se, but rather on 'what is special about those perceptions, sensations, feelings and thoughts that have a feel to them. What exactly is this feeling that conscious experience have'.[22] And, why it seems that there is something determining 'what it is like to be' conscious of somebody. 'What-is-it-likeness' is one of the features characterising consciousness. This feature was developed mainly by the American philosopher, Thomas

[19] ibid.
[20] Descartes, R., *The Principles of Philosophy* (The Online Library of Liberty) <http://oll.libertyfund.org/?option=com_staticxt&staticfile=show.php%3Ftitle=1698&chapter=142027&layout=html&Itemid=27> [accessed 02 January 2012].
[21] Locke, J., *An Essay Concerning Human Understanding* (London: Ward Lock and Co. Ltd, 1910), p. 63.
[22] Frankish, K., *Consciousness* (Milton Keynes: The Open University, 2005), p. 5.

Nagel, who asked the famous question 'What is it like to be a bat?' bringing this very important notion of 'what-is-it-likeness' to discussion about consciousness. Being a bat is a totally different experience to being a human; man cannot know what a bat thinks, what its feelings and sensations are. Man does not know how a bat perceives the world and – what is the most important thing – man cannot have any of the bat's experiences. Flying, eating insects and echolocatory are totally strange to people. All people can do is to try to imagine what it is like to experience these things. However, there is still a problem: the imagination is limited and based on prior experiences. In consequence, everything that people can imagine, is what it would be like for them to behave as a bat behaves, which still is not the answer for 'what is it like for a bat to be a bat?'. It is just imagining the bat's sensations, not experiencing them as such, as bat does. What-it-is-likeness determines if a thing is conscious.[23]

Another essential meaning of the term is phenomenality or phenomenal consciousness, which describes consciousness as a subjective experience or phenomenal experience. This is the way things appear to me, as opposed to how they are objectively. Distinction between kinds of state consciousness ('your experiences being consciousness' in contrast to creature consciousness – 'you being consciousness') has been made by the American philosopher Ned Block.[24] He made a comparison between phenomenal consciousness (p-consciousness), which focuses on what it is like to be in a certain state, with access consciousness (a-consciousness), which refers to availability in the process of thinking or guiding actions and speech. P-consciousness is the main subject Nagel explores and is the core of the problem of consciousness.[25]

When discussing consciousness, qualia have to be mentioned, since they are not only a very important feature of consciousness, but also they cause a fundamental problem for materialists in explaining mind-body dichotomy. Qualia are the ineffable subjective qualities of experience, such as the redness of red or the indescribable smell of turpentine. These subjective feelings are properties that physical objects do not possess.[26] However, many philosophers such as Paul Churchland and Daniel Dennett refuse to accept qualia as truly existing. Dennett in particular criticises it as a fallacy

[23] Nagel, T., 'What is it like to be a bat?', *The Philosophical Review*, 4 (1974), <http://organizations.utep.edu/Portals/1475/nagel_bat.pdf> [accessed 25 April 2011].

[24] Block, N., *Consciousness, Function, and Representation* (Massachusetts: MIT, 2007), p. 276-291.
[25] ibid.
[26] Blackmore, S., *Consciousness. A Very Short Introduction* (Oxford: Oxford University Press, 2005), p. 6-9.

inherited from the previous philosophical traditions. He claims that qualia come from the clearest intuitions about mind that philosophers used to have and

> form a mutually self-supporting closed circles of doctrines, imprisoning their imaginations in the Cartesian Theater. Even though philosophers have discovered the paradoxes inherent in this closed circle of ideas – that is why the literature on qualia exists – they have not had a whole alternative vision to leap to, and so, trusting their still-strong intuitions, they get dragged back into the paradoxical prison.[27]

He tries to disqualify qualia with the use of science. For instance, the example with the redness of red in the scientific enquiry will be just a colourless electromagnetic radiation with the different lengths of waves that come across surfaces and can reflect or absorb that radiation. Dennett says that modern science has removed the notion of colour from the physical world and shows 'that the light-reflecting properties of objects causes creatures to go into various discriminative states, scattered about in their brains, and underlying a host of innate dispositions and learned habits of varying complexity'.[28]

Although, it is possible to specify and describe particular features of consciousness, it is still not possible to give an exact definition of that term. As Keith Frankish wrote in his book *Consciousness*: 'Consciousness is a fascinating but elusive phenomenon: it is impossible to specify what it is, what it does or why it evolved'.[29] From a neurological point of view, it is certain that consciousness is closely dependant on the brain. For example: any mechanical damage or drugs that affect the brain as well as the stimulation of different parts of a brain can alter mental states. It is still a mystery though, how consciousness is generated by the brain. Michael Lockwood points out the necessity of avoiding the mistaken manner of thinking that scientists or neurologists do not have sufficient knowledge of how 'the brain functions, in physic-chemical terms. For it seems clear that more knowledge of the same general kind that neuroscience currently offers could not – in principle could not – shed any further light on the fundamental problem that consciousness raises'.[30] The Australian philosopher, David Chalmers, has distinguished the problem of consciousness between the 'hard' and 'easy' problem. The 'easy' one refers to the objective neurological study of the brain and can be solved using

[27] Dennett, D. C., *Consciousness Explained* (London: The Penguin Press, 1991), p. 370.

[28] ibid., p. 372.
[29] Frankish, K., *Consciousness* (Milton Keynes: The Open University, 2005), p. 1.
[30] Lockwood, M., *Mind, Brain and the Quantum* (Oxford: Blackwell, 1991), p. 1.

straightforward scientific method. It explains the role of different kinds of psychological states and their implementation in the brains of different creatures (analysis of pain, vision, memory, and so on). However, it does not give any explanation about all feelings involved. The 'hard' problem (also identified as 'the explanatory gap' by the American philosopher, Joseph Levine) is when we are trying to find the answer where the feelings are from, how phenomenal consciousness can be explained and why it is 'like something' to be us? It is the gap between that which science can tell us and that which we most want to explain.[31]

The understanding of consciousness can be simplified to the three questions: 'What', 'How', and 'Why' to describe the features of consciousness, explaining its underlying basis or cause, and explicating its role or value:

- The Descriptive Question: *What* is consciousness? What are its principal features? And by what means can they best be discovered, described and modeled?
- The Explanatory Question: *How* does consciousness of the relevant sort come to exist? Is it a primitive aspect of reality, and if not how does (or could) consciousness in the relevant respect arise from or be caused by non-conscious entities or processes?
- The Functional Question: *Why* does consciousness of the relevant sort exist? Does it have a function, and if so what is it? Does it act causally and if so with what sorts of effects? Does it make a difference to the operation of systems in which it is present, and if so why and how?[32]

Many theories have arisen in response to these questions which try to put a subjective consciousness into the objective world, taking the role of the brain functions into account. In general, theories fall into three main categories: dualist, monist and mysterian. The first naturally distinguishes subjective features of consciousness from brain activities. The dualist theories of mind 'claim that mental states and processes are not merely states and processes of a purely physical system, but constitute a distinct kind of phenomenon that is essentially nonphysical in nature'.[33] But, questions such as how interaction is possible between subjective elements and the physical entities present in time and space, and,

[31] Papineau, D., Selina, H., *Introducing Consciousness* (Cambridge: Icon Books, 2000), p. 18-22.
[32] Stanford Encyclopedia of Philosophy, *Consciousness* (Stanford: Stanford University, 2004) <http://plato.stanford.edu/entries/consciousness/#2> [accessed 25 April 2011].
[33] Churchland, P.M., *Matter and Consciousness* (London: A Bradford Book, 2001), p. 2.

how these subjective elements emerge. Conversely, the monist theory does not make any distinction between the subjective mind and brain activity. All three theories claim that, 'what we call mental states and processes are merely sophisticated states and processes of a complex physical system: the brain'.[34] The issue for monism is to explain how mind and brain can be one (or identical) if they appear to be so different. The mysterian theory deals with consciousness as a complete mystery which meanders cannot be solved by human beings at present, and possibly ever.[35] Thus, this discussion will not include the evaluation of this option.

1.2. Dualism.

According to Paul Churchland the discussion about the epistemological basis of consciousness leads to

> the most obvious of the questions in this areas. What is the real nature of the mental states and processes? In what medium do they take place, and how are they related to the physical world? With regard to the mind, these questions address what philosophers call the ontological problem.[36]

As a first approximation, ontology is the study of what there is, what sorts of things exist. Ontology is the branch of philosophy that studies the structure of reality and problems of the being and its features.

> Many classical philosophical problems are problems in ontology, like the question whether or not there is a god, or the problem of the existence of universals. These are all problems in ontology in the sense that they deal with whether or not a certain thing, or more broadly entity, exists. But ontology is usually also taken to encompass problems about the most general features and relations of the entities which do exist. There are also a number of classic philosophical problems that are problems in ontology understood this way.[37]

[34] ibid.
[35] Stanford Encyclopedia of Philosophy, *Consciousness* (Stanford: Stanford University, 2004) <http://plato.stanford.edu/entries/consciousness/#2> [accessed 25 April 2011].
[36] Churchland, P. M., *Matter and Consciousness* (London: A Bradford Book, 2001), p. 2.

[37] Stanford Encyclopedia of Philosophy, *Logic and Ontology* (Stanford: Stanford University, 2004) < http://plato.stanford.edu/entries/logic-ontology/#3> [accessed 25 April 2011].

The ontological problem in the philosophy of mind is more widely known as the mind-body problem.

From ancient times people have been trying to discover and understand the true nature of the mind. The concept of a non-physical soul and physical body was initiated by Aristotle and Plato as a set of views about the relationship between mind and matter. 'After Plato, the most famous exponent of dualism was Rene Descartes (1596-1650). The fresh impetus Descartes gave to dualism was so strikingly original and compelling that the version he formulated is named after him and called Cartesian dualism'.[38] Soul in religion and philosophy is the immaterial aspect or essence of a human being. It is often considered synonymous with the mind or the self. A further definition of soul can be found in theology. According to theological belief, the soul is the part of an individual which partakes of divinity and survives the death of the body. However, the notion of 'this everlasting life' is incompatible with the view that if mental life of an individual 'is identical with the functioning of that individual's brain, it is clear that when at death the brain ceases to function the mental life must thereby come to an end'.[39] Descartes describes soul as an incorporeal, immaterial logical substance, with no features of material body and, what is more, indivisible. He believes in the union of the body and the soul, each being a distinct substance acting on the other. The soul is also equivalent to the mind.[40] Conceived of as *res cogitans* (a thinking thing), a person is totally different from his or her extended body (*res extensa* - a thing whose essence is extension in space). Descartes states the divisibility of body is a non-conscious machine incapable of thought and awareness. To sum up, the soul is conscious, but incapable of extension, while the body is extended, but incapable of consciousness and mentality.[41] Descartes supposed the pineal gland (a small structure in a brain situated beneath the *corpus callosum*, near the centre of brain) to be a centre of the interaction between soul and body. John Heil supposed that if Descartes were right 'minute alternations in the motions of particles in the pineal gland radiated throughout the body via nervous system, producing muscular contractions and, ultimately, overt bodily motions'.[42] However, this would violate the physical laws governing the micro-particles that make up the pineal gland and that is 'an impossibility if we take the material world to be causally self-contained and laws of nature to be inviolable'.[43]

[38] Maslin, I., *An Introduction to the Philosophy of Mind* (Cambridge: Polity, 2007), p. 38.
[39] Gregory, R. L., (ed.) *The Oxford Companion to the Mind* (Oxford: Oxford University Press, 1987), p. 770.
[40] ibid., p. 189-190.
[41] Maslin, I., *An Introduction to the Philosophy of Mind* (Cambridge: Polity, 2007), p. 38-39.
[42] Heil, J., *Philosophy of Mind. A Contemporary Introduction* (Oxon: Routledge, 2005), p. 23.

[43] ibid., p. 23.

In *Meditation I*, Descartes presented the so called ‘Argument from doubt’ – probably his most famous argument in favour of dualism and the existence of soul. Descartes did not want to assess knowledge according to this – what is its subject – but according to the method by means of which we obtain that knowledge. Descartes did not make any distinction between scientific and non-scientific knowledge. He focused on 'how and by means of what' we gain knowledge rather than 'about what'. His fundamental question was: is anything from this, that we know, absolutely certain? Descartes started by questioning all beliefs that come from our senses. He claims that senses can delude us, therefore empirical methods do not have any learning value.

Descartes' argument against the empirical knowledge was The Dream Argument. According to this, most of the time when we are dreaming, we are not aware that we are dreaming but we can still dream so vividly, we can experience our dream reality with the same intensity as we experience reality when we are awake. 'For whether I am awake or sleeping, two and three added together always make five, and a square never has more than four sides; and it does not seem possible that truths so apparent can be suspected of any falsity or uncertainty'.[44]

Up to this point, Descartes did not bring into doubt anything new; he had many predecessors who had done that before him (such as Plotinus and his distinctions between the nature of the soul and knowledge of its own nature that the soul possesses).[45] But then, Descartes went even further: he stopped finding the rules of logic and mathematics certain. For this rule, no empirical sensation has any influence and even in a dream two plus two equals four. This is, no doubt, the breakthrough in Descartes' theory. Then, he presented two more arguments - The Deceiving God Argument and The Evil Demon Argument. According to these - no empirical, no mathematical certainty can be certain. Descartes believes that the powerful deceiver (that is God or, if we suppose God is supremely good, or some evil genius), who can give us any illusion He wants and He can delude us whenever He wants. God in Descartes' eyes is above logic, and can make two plus two equal five and the Deceiver can delude us all the time. Descartes wrote ‘of all the opinions that I once accepted as true, there is not one which is not now legitimately open to doubt, not through any lack of reflection or lightness of judgement, but for very strong and deeply considered reasons’.[46]

[44] Descartes, R., *Discourse on Method and the Meditations* (Suffolk: Penguin Classics, 1971), p. 98.
[45] Russell, B., *History of Western Philosophy* (Bucks: Book Club Associates, 1979), p. 297.
[46] Descartes, R., *Discourse on Method and the Meditations* (Suffolk: Penguin Classics, 1971), p. 99.

Having rejected all empirical methods and knowledge, Descartes was now looking for certain knowledge that will be without any doubt. This is how he made the foundation for certain knowledge. As he wrote in *Meditation II,* 'so that, after having thought carefully about it, and having scrupulously examined everything, one must then, in conclusion, take as assured that the proposition: I am, I exist, is necessarily true, every time I express it or conceive of it in my mind'.[47] That is his famous *cogito ergo sum*. According to Descartes, it is impossible in systematic doubting to doubt whether oneself is doubting. What is more, doubting means that oneself is thinking. And thus is the proof of existence: one who is thinking, has to exist. As a consequence of such argumentation, it is not possible to prove existence as a physical body but it is a solid proof that the thinking mind exists. The argument can be simplified as follows:

1. I can doubt that I have body.
2. I cannot doubt that I exist.
3. Therefore, I am not my body.
4. Therefore, my mind is not my body.

In a shorter version, this argument can be presented as:

1. I can doubt that my body exists.
2. I cannot doubt that I exist.
3. Therefore, I must be different and distinct from my body.

This argument relies on the principle called Leibniz's Law.[48] According to this law, if A is identical to B, then any property of A is a property of B, or whatever is true of A is true of B. However, this argument proves unconvincing if we use the parallel argument to Descartes':

1.Oedipus is going to marry the Queen of Thebes.

[47] ibid., p. 103.
[48] Ravenscroft, I., *Philosophy of Mind. A Begginer's Guide* (Oxford: Oxford University Press, 2005), p. 13.

2. Oedipus does not know that the Queen of Thebes is his mother.

3. Therefore, the Queen of Thebes cannot be his mother.

Using this pattern, we come to the conclusion, that this way of reasoning has to be fallacious. We can consider that premises are true. However, the conclusion does not follow them. We can doubt that a certain geometrical figure has some very particular property A and the same time, we cannot doubt that this figure has property B. However, it does not mean that from these two premises we can establish that B does not entail A.[49]

There are also other problems for dualism, such as the contradiction of a basic scientific principle or the interaction problem. According to a basic scientific principle, every action or change in an object has some prior physical event. Thus, if an A-fibre or C-fibre transmission occurs, the neurologist can search for the physical cause of it. However, if we assume that pure mental activity (like a thought) can lead to action, it means that other mental events can lead to physical reactions. This issue is closely connected with the problem of interaction – if mind and body are two such different substances, how they can possibly interact? What is more, if physical activity in a brain is linked with mental events (for example: severe damage to brain leads to mental deficiency) – are these two substances really so distinct? Moreover, dualism cannot be scientifically investigated, since science deals only with the physical world. Thus, the only aspect that could be scientifically investigated are the effects obtained in the world.

1.3. Monism.

Whilst dualist theory explains the separation between physical and mental events, 'there are wholly monistic theories which assert that there only appear to be two types of events, and that there really is only one type of event'.[50] Monism is a viewpoint in philosophy which claims that all things are homogenous in nature. Monism is divided into three groups: neutral monism (there is one type of event and it is neither exactly physical nor mental), materialistic monism (materialism) and idealistic monism (idealism).

[49] Malcolm, N., *Problems of Mind. Descartes to Wittgenstein* (London: George Allen & Unwin Ltd, 1972), p. 3-4.

[50] Hodgson, D., *The Mind Matters* (Oxford: Clarendon Press, 1991), p. 59.

The beginning of materialism dates back to ancient times, when Democritus described the world as a fleeting arrangement of atoms swirling in the void. Mental phenomena are described by Hobbes and La Mettrie as nothing more than the mechanical interaction of material components.[51] Nowadays, materialism of one stripe or another is often not taken for granted; as David Levis said, 'materialism is non negotiable'.[52] Materialism discusses mental events as not self contained and always in relation to material beings. However, there are many different forms of materialism as well as definitions of 'matter' and 'material'. Preceded by the success of the Newtonian mechanics, it became common to use the term 'material' for everything that 'has mass'. The concept of 'matter' is purely philosophical and it does not belong to any particular science, which means that it has to be defined in the manner that includes all objects examined by natural science. It cannot be done by defining material as being subject to changeability, duration in time and extension in space and law. Matter can also be described as a totality of existing objectively material beings, which can be examined by the senses (directly or indirectly). According to this definition, the concept of matter refers to macro subjects (including organisms), elementary particles, fields (gravitational, electromagnetic as well as nuclear forces), antimatter and other objects, including those not yet known.[53]

Materialism or physicalism states that all mental phenomena can be explained by brain activity and are identical with it. As a result of such thinking, statements about mental events and states of brain activity are two different ways of considering the same subject. This concept denies the existence of non-material souls, beings of the nature of platonic ideas and a non-material god. However, physicalism does not provide the answer to the relationship between mental and physical, biological and chemical activities in a body. This is a so-called mind-body problem, which can also be observed in the dualistic viewpoint in ontology.

There are different faces of materialism, specifically, behaviourism, functionalism and identity theory. According to behaviourists such as Gilbert Ryle, talking about mental states is nothing more than describing in a shortened way people behaviours and predispositions to behaving in a particular manner. All problems discussed in mental terms can be described and then explained in terms of patterns of behaviour. Behaviourism depreciates scientific psychology based on introspection of subjective states as well as the concept of the mind as a sphere of mental events. For that reason,

[51] Heil, J., *Philosophy of Mind. A Contemporary Introduction* (Oxon: Routledge, 2005), p. 51.
[52] ibid.
[53] Stanford Encyclopedia of Philosophy, *Isaac Newton* (Stanford: Stanford University, 2007) < http://plato.stanford.edu/entries/newton/#NewWorInf> [accessed 25 April 2011].

the mind-body problem is basically non-existent in behaviourism.[54] 'Thinking, feeling and scheming are nothing more than ways of behaving'.[55] The main problem with behaviourism is the failure of being able to make the distinction between somebody being in pain and just pretending to be in pain. Moreover, behaviourists reject qualia and leave the question of what it actually feels like to be in a very particular mental state without the answer.

In functionalism, supported by David Levis, Hilary Putnam, mental states are in fact functional states which interact, playing a functional role in cognition. A 'computer metaphor' was introduced by functionalists to portray the mind as software and the brain as hardware.[56] Moreover

> functionalism allows for the possibility of non physical conscious beings. If states of mind are functional states, and if functional states are 'realized' in conscious creatures by states with an appropriate causal profile, this leaves open the possibility that immaterial beings could be conscious, think, feel pain.[57]

As well as for behaviourism, qualia create a problem for functionalism. First of all, a computer analogy cannot give a complete explanation of the mind and secondly, functionalism does not explain the 'what-is-it-likeness' and does not give an adequate account of conscious experiences (being in pain, being happy, thinking about abstract ideas).

Finally, identity theory claims that 'mental events and their associated physical events are two different aspects or manifestations of the same events, two side as it were of the same coin'.[58] Unlike functionalism, which links every kind of conscious experience with interactions arising in complex physical states, identity theory identifies that experience with a particular physical state or its property. Thus, the concept of consciousness in identity theory is based on neurophysiology and neurophysiological activity of the brain, while in functionalism, functional states arise between entries and exits of the system and different states of mind. The problem for identity theory occurs, when we assume that in the same brain states could be different thoughts. Two brains could be physically identical

[54] Heil, J., *Philosophy of Mind. A Guide and Anthology* (Oxford: Oxford University Press, 2004), p. 75-84.
[55] ibid., p. 77.
[56] ibid., p. 139-149.
[57] ibid., p. 148.
[58] Hodgson, D., *The Mind Matters* (Oxford: Clarendon Press, 1991), p. 59.

(the same brain cells, fibres and molecules) and still mentally completely distinct. What is more, if mental events are identical with certain brain states, it should be possible to find the exact place where they are located. However, it is not conceivable to find in a brain the precise locations of the thoughts about family or weather.

Similarly to materialism, idealistic monism is expressed in different forms. What these forms have in common is the acceptance of the thesis that the only self-contained beings are in fact nonmaterial substances. Both materialism and idealism have a common reductionist element – whilst minds and the content of the mind is reduced to material objects in materialism, in idealism material objects and their properties are reduced to minds and states of mind.[59] Therefore, only mental states exist for the idealist, and all physical events and states are constructed from those states of mind. This view leaves the same problem as in case of materialism – how to describe the relationship between events that construct and events constructed. 'Even regarding physical events and states as constructs from mental events and states, it is clear that mental events and states are closely associated with particular classes of such constructs, namely neutral activity in brains'.[60] There is no argument in idealism that material objects are only states of mind. An even stronger claim is made: 'talk of material objects is not merely false but positively meaningless'.[61]

George Berkeley, the great philosopher of the early modern period, supported theory denying the existence of material substance and in his *A Treatise Concerning the Principles of Human Knowledge* wrote:

> it is evident to anyone who takes a survey of the objects of human knowledge, that they are either ideas actually imprinted on the senses, or else such as are perceived by attending to the passions and operations of the mind, or lastly originally perceived in the aforesaid ways.[62]

Berkeley's claim is that nonmaterial human souls and God are self-contained. All material objects exist because they are perceived by God, and all ideas are the immediate objects of knowledge in a fundamental sense. Furthermore, because they are objects of

[59] Heil, J., *Philosophy of Mind. A Guide and Anthology* (Oxford: Oxford University Press, 2004), p. 817.
[60] Hodgson, D., *The Mind Matters* (Oxford: Clarendon Press, 1991), p. 59-60.
[61] Heil, J., *Philosophy of Mind. A Guide and Anthology* (Oxford: Oxford University Press, 2004), p. 818.
[62] Berkeley, G., *A Treatise Concerning the Principles of Human Knowledge* (Indianapolis: The Liberal Arts Press, 1957), p. 23.

knowledge, there is a need for the existence of 'something which knows or perceives them and exercise diverse operations, as willing, imagining, remembering, about them'.[63] Berkeley used different names for that 'something' – mind, spirit, soul or just myself – and underlines the distinction between 'that something' and ideas. *Esse est percipi* – to be is to be perceived, as Berkeley stated. As a consequence, the existence of unthinking (so unperceiving) things out of the mind is impossible as he states, 'for as to what is said of the absolute existence of unthinking things without any relation to their being perceived, that seems perfectly unintelligible'.[64]

What is worth underlining, in Berkeley's subjective idealism is that physical objects do not exist objectively, i.e. independently from the perceiving subject. However, it does not automatically mean that the act of perceiving causes the objective existence of the physical object and the end of the act makes the object disappear. There is no objective existence of objects in subjective idealism. What their existence depends on is perception. But, the concept faces two problems. Firstly, in the material world of physical objects, permanence and continuity are observed regardless of perceiving not being permanent nor continuous. Secondly, why do observers not have any influence on the perceiving things? George Berkeley claims that the existence of physical objects depends on God's perceiving things constantly. There is also a difference between physical and fictional objects. The former is generally perceived by God and sometimes by a man, the latter is 'perceived' only by man. Idealists will say that 'not only is the impression of mind-body causal interaction an illusion, but the material world is itself an illusion'.[65]

[63] ibid., p. 24.
[64] ibid.
[65] Heil, J., *Philosophy of Mind. A Contemporary Introduction* (Oxon: Routledge, 2005), p. 33.

# Chapter 2

## 2.1. Philosophy and science.

'Consciousness: the having of perceptions, thoughts, and feelings; awareness. The term is impossible to define except in terms that are unintelligible without a grasp of what consciousness means'.[66] There is still no final answer what consciousness is. It is quite possible that comprehensive definition of the phenomenon requires theories of many types. Regardless of whether a single theoretical perspective or a synthetic and pluralistic approach is necessary to understand consciousness, it still remains the great mystery for people and represents the current gap in knowledge. It is a big challenge to explain how subjective or phenomenal consciousness fits into the objective world. Dualists claim that the mind is separate and distinct from the body, but that gives rise to the problem of their mutual interaction. On the other hand, monists state that the subjective mind and the objective brain are united behind their appearances. The problem for materialism is to explain how something that appears so different such as mind and matter, can be identical.

The mind-body problem shows how strongly philosophy, especially philosophy of the mind, is connected with science. It is widely accepted that consciousness is considered mainly in the context of neurology and the mind-body problem belongs to the domain of neuroscience, psychology and philosophy, later broadened by behavioural science and cognitive science. While no objective scientific definition seems to be able to capture the essence of this phenomenon, it is still possible to give examples for what tends intuitively to be called consciousness or being conscious by these disciplines. Together they are bringing fresh insight to the problem. The relation between mind and body started to be tackled from a completely new point of view, since the philosophers (such as Penrose or Lockwood) have started to assimilate the implications of quantum physics (for example: quantum superposition or non-locality). But a problem occurs in that quantum mechanics is still just a theory and it is still not clear what influence and consequences it has for the understanding of minds. Nevertheless, quantum mechanics has initiated a reexamination of the views of brains and bodies so far. It may explain consciousness and give the answers to the age-old metaphysical questions on the relationship and parallelisms of body and mind.

[66] Frankish, K., *Consciousness* (Milton Keynes: The Open University, 2005), p. 1.

Before discussing the contribution of quantum mechanics for the studies of consciousness and matter, the mutual relation between philosophy and science should be considered. Jean Piaget, a Swiss psychologist and philosopher, said that 'philosophy takes up a rational position to the whole of reality'.[67] His concept of 'the whole of reality' consists of three components. Firstly, the higher activities of man (such as moral, aesthetic, religious or humanist faith). Next, knowledge that implies the existence of an ultimate reality, an absolute or a thing in itself. Thirdly, the reflections on the whole of reality being able to cause insight into the realm of possibility.[68] Piaget claims that all, from the biggest systems in history of philosophy, including those that gave the beginning for other systems and which continue to have a permanent influence on human thoughts, have arisen from the reflections on scientific discoveries. It does not matter if those reflections were made by people personally involved in scientific discoveries, or rather applied to scientific revolution that took place in their days or epoch directly preceding. In the whole history of philosophy two important tendencies are noticeable. The first is made up of problems concerning life and its sense with reference to the whole reality. This tendency is constant in contrast to the second which is variable. Our resources of knowledge of the world make up the second tendency. Our knowledge is constantly changing, which simply means that philosophy also has to be changed. Thus, the origin of mathematics had influence on Plato's system. Both biology and logic affected Aristotle. Cartesian thought has its beginnings in analytical geometry and algebra, whereas Newtonian physics were formulated the system of Immanuel Kant. It seems to be obvious, that history and sociology had a huge influence on the systems of Hegel and Karol Marx. This is also the case in Roger Penrose and Stuart Hameroff, in turn: the distinguished physicist and anesthesiologist, who introduced quantum theory to the phenomenon of consciousness. This theory may be necessary to understand the concept of consciousness, and both Penrose and Hameroff

> have written so extensively on the relevance of quantum theory to the understanding of consciousness. Their sincere and sustained effort to tie quantum mechanics to the specific workings of the brain in a manner permitting possible experimental tests is laudable and provides us with a chance to better understand how these seemingly disparate approaches might be unified.[69]

Philosophy needs some kind of stimulus coming from outside for its development. When there is a new theoretical context, philosophy can start to search for an answer to the mysteries of existence. In a new theoretical context, parts of old answers considered as

[67] Piaget, J., *Insights and Illusions of Philosophy* (Oxon: Routledge, 1997), p. 39.
[68] ibid.
[69] Hobson, J.A., *Consciousness* (New York: Scientific American Library, 1998), p. 124.

true and possible became out of date, but in their place appears some new and the big mystery is seen in new light. Simultaneously, there appears new additional questions.[70]

According to Piaget's, *Tractatus logico-philosophicus* by Ludwig Wittgenstein was the first book inspired by mathematical logic. Wittgenstein claimed that philosophy can never be a science and made quite a clear distinction between these two. Philosophy should clarify thoughts logically.

> Philosophy is not a theory but an activity. A philosophical work consists essentially of elucidations. The result of philosophy is not a number of "philosophical prepositions", but to make propositions clear. Philosophy should make clear and delimit sharply the thoughts which otherwise are, as it were, opaque and blurred.[71]

While science works within meaning and language, philosophy should be interested in the limits of meaning and language. 'The business of philosophy is critique. It clarifies the limits of meaningful language. Science on the other hand consist of all true propositions. It studies the existence or nonexistence of states of affairs'.[72] Philosophy should run up against the boundaries of language and make them comprehensible and clear.

In his *Tractatus logico-philosophicus,* Wittgenstein claims that statements about good and bad or about the reality and the essence of existence can be called 'metaphysics'. However, by the end of his book, from thesis 6.1 to 6.5 he claims that anything which is metaphysical cannot be reasonably described. We cannot get to know anything new about the essence of existence from logic – '6.1 The prepositions of logic are tautologies' and it is the same situation with the mathematical laws – '6.24 The method by which mathematics arrives at its equations is the method of substitution. For equations express the substitutability of two expressions, and we proceed from a number of equations to new equations, replacing expressions by others in accordance with the equations'.[73, 74] Moreover, biology and the laws of nature seem to be also redundant and not helpful at all in searching for the essence of the world. However, there is also thesis 6.522: 'There is indeed the inexpressible. This shows itself; it is the mystical'.[75] Everything that exists in

[70] Piaget, J., *Insights and Illusions of Philosophy* (Oxon: Routledge, 1997), p. 39-78.
[71] Kenny, A., *The Wittgenstein Reader* (Oxford: Blackwell, 1995), p. 14.

[72] Heaton, J., Groves, J., *Wittgenstein For Beginners* (Cambridge: Icon Books, 1994), p. 41.
[73] Kenny, A., *The Wittgenstein Reader* (Oxford: Blackwell, 1995), p. 25.
[74] ibid., p. 27.
[75] ibid., p. 31.

our world, can be described. Everything that can be described, exists. Everything that is mystical, cannot be described and thereby – do not belong to the world. According to Wittgenstein, if there is any absolute value, it has to be somewhere 'outside'. This value does not belong to our world. That is the reason, why nobody has found it already, despite the fact that a lot of people have tried to. If the absolute value or answers to problems of life do not belong to the world, neither philosophy nor science can give us an answer or solve them. They are things which cannot be described and determined. And '7. Whereof one cannot speak, thereof one must be silent'.[76]

Wittgenstein wrote that,

> The right method of philosophy would be this. To say nothing except what can be said [...] and then always, when someone else wished to say something metaphysical, to demonstrate to him that he has given no meaning to certain signs in his prepositions. This method would be unsatisfying to the other [...] but it would be the only strictly correct method.[77]

For Wittgenstein philosophy can never be a science. It looks at things that are not scientific facts, and what is more, things that cannot even be verified. The ethical propositions show but cannot say, they represent attitude towards the world. In that case, they cannot be explained by the use of scientific method. Thus, even if people find answers for all scientific questions, problems of life remain untouched, because they do not belong to the scientific domain and cannot be solved scientifically.

On the other side, the development of the science, especially new physics, makes it similar to philosophy to a large extent. There is a gradual movement from the empirical laws to the explanatory theories, and then to the theories unifying wider and wider fields of physics that encompass more phenomena and reach to the deeper and more general aspects of reality. Finally, contemporary cosmology is inseparably connected with physics. Moreover, in the context of discovery, physics starts by using the hypothetic and deductive method while formulating theories, not the inductive method. There is more and more space for speculations, since these theories cannot be derived from experiments. In the context of justification, it appears that theories in physics are not verifiable nor conclusively falsifiable, but only confirmable. With the progress of physics, the

[76] ibid.
[77] ibid.

disproportion between the development of theories and possibilities of their experimental testing came to the fore.[78] The development of quantum theory requires 'abandonment of the age-old ambition of calculating with certainty every detail of the behaviour of any system'.[79] This is the case of programmes searching for the quantum gravity and theories unifying quantum mechanics with general theory of relativity, where the confirmations are mathematically coherent, but it is possible to justify only the fragments or some aspects of these theories. Furthermore, in the new physics, there are fields not confirmable in principle, such as the various interpretations of quantum mechanics. They are not confirmable to the same extent as metaphysics in philosophy.[80]

The new physics deals with the fundamental, deep and the most general aspects and features of reality. Together with contemporary cosmology, it aims to give the most adequate description of the world as integrity. 'The revolution in modern physics has been hailed as a triumph for the "no nonsense" philosophical approach of "positivism" and "operationalism", but there have also been much publicized claims that modern physics is a vindication of such diverse theories as "subjective idealism", "dialectical materialism", "panpsychism", and "Buddhist metaphysics"'.[81] There is of course a need for critical examination and search for consistency with the aspiration to an understanding of the nature of things. Before Aristotle made the distinction between philosophy as a study of being and physics as an empirical reflection of nature, the subject of philosophy and physics was identical. Nowadays, when methods in the new physics are changing, and as at the advanced level it is becoming more and more speculative, it seems to be becoming even more closely connected with philosophy.

## 2.2. Substance and matter.

The terms 'substance' and 'matter' have different meanings in philosophical and ordinary or scientific language. Usually, in everyday conversations, 'substance' is associated with the concept of matter and it means the material of which something was made (for example: wood, plastic or metal). Bertrand Russell explains that

[78] Powers, J., *Philosophy and the New Physics* (London: Methuen, 1982), p. 165-172.
[79] ibid., p. 170.
[80] ibid., p. 165-172.

[81] ibid., p. 1.

> common sense thinks of the physical world as composed of 'things' which persist through a certain period of time and move in space. Philosophy and physics developed the notion of 'thing' into that of 'material substance', and thought of material substance as consisting of particle, each very small, and each persisting throughout all time.[82]

Thus, matter is anything that exists in a space and possesses mass, and is distinct from the mind. While 'in mythology and early science mind and matter are hardly separated, and matter is seen as alive and intelligent', the development of physics just deepens the distinction between the world of physical reality and the world of perceived experience, and 'matter seems to be more and more different from mind'.[83]

In Ancient Greece, philosophers were looking for *arché*, the primitive principle which directs the whole world and universe, that is the representation of the reason of all beings and at the same time their principle. The existence of this principle was postulated by The Ionian School (a type of Greek philosophy centered in Miletus, Ionia in the 6th and 5th centuries BC) and represented by such philosophers as a Thales, Anaximander, Anaximenes or Heraclitus.[84] First philosophical theories were characterized by the view, that everything that exists, has one common principle, the *arché.* For Thales it was water, for Empedocles the four elements (fire, water, air and earth) that composed all matter. In the fifth century BC Democritus began the doctrine of materialism by proposing the atomistic nature of matter. He suggested that matter is made up of eternal and indestructible units – atoms. Democritus hypothesized that the atoms themselves are unchanging, and they have 'fixed properties such as size and shape, but they could move about in space and combine together in various ways, so that the macroscopic bodies which they constitute might seem to alter'.[85] This made possible the notion of permanence and the state of flux at the same time – all changes were attributed to the rearrangements of unchanging atoms.

However, the idea of Democritus was just a philosophical conception of the nature of reality. It was not based on any empirical data or observations. In fact, 'for centuries, materialism had to compete with other ideas – for example, with the belief that matter possessed magical or active qualities, or could be infused with vitalistic potency or occult

[82] Russell, B., *History of Western Philosophy* (Aylesbury: Book Club Associates, 1979), p. 786.
[83] Gregory, R. L. (ed.), *The Oxford Companion to the Mind* (Oxford: Oxford University Press, 1987), p. 450.
[84] Russell, B., *History of Western Philosophy* (Aylesbury: Book Club Associates, 1979), p. 44-48.
[85] Davies, P., Gribbin, J., *The Matter Myth* (London: Penguin Books, 1992), p. 4.

forces'.[86] The majority of these beliefs were removed from atomistic theories in the seventeenth century, particularly after the publication of Newton's *Principia* in 1687. The Newtonian image of nature 'had established a clear connection between cause and effect, and the mechanistic account required that matter moves in accordance with strict mathematical laws. There was no room for mysterious active qualities'.[87] The atomistic theory had been developed further through the works of Antoine Lavoisier and John Dalton and transformed chemistry and physics into exact science. Nevertheless, the rise of quantum theory brought the laws of chance and unclear conjunctions of waves and particles into the deterministic and clockwork image of the Newtonian universe. According to quantum field theory, solid matter can dissolve away and be replaced by vibrations of invisible field energy. It leads to the superstring theory 'which seeks to unite space, time and matter, and to build all of them from the vibrations of sub-microscopic loops of invisible string inhabiting a ten-dimensional imaginary universe'.[88] Thus, 'quantum physics undermines materialism because it reveals that matter has far less "substance" than we might believe'.[89]

Despite the fact that seventeenth century science (especially the rise of classical physics) legitimized the atomistic image of world, Spinoza continued the philosophical tradition of Parmenides and his holistic belief in a single substance. With the development of quantum theory, Spinoza's views seem far more appropriate. Before presenting Spinoza's understanding of the notion 'substance', the general philosophical meaning of 'substance' and the understanding of the term by two predecessors of Spinoza – Aristotle and Descartes needs to be explained.

In philosophy, there are two different way of explaining the notion of 'substance'. The first is more general and according to this, the term 'substance' is derived from Greek *ousia*. *Ousia* is the third person singular feminine present participle of the verb 'be', that was transmitted via the Latin *substantia* with the meaning 'something that stands under or grounds things'.[90] According to this definition, substance appears in almost every philosophical system and represents the fundamental or the foundational entities of reality. This means, an atom is the substance for an atomist because it represents the basic thing from which everything is constructed, and Forms are the substances for Plato, because everything derives their existence from them.

[86] ibid., p. 4-5.
[87] ibid., p. 6.
[88] ibid., p. 8.
[89] ibid.
[90] Stanford Encyclopedia of Philosophy, *Substance* (Stanford: Stanford University, 2009) < http://plato.stanford.edu/entries/substance/ > [accessed 08 May 2011].

> Probably the only theories which do not would be those forms of logical positivism or pragmatism which treat ontology as a matter of convention. According to such theories, there are no real facts about what is ontologically basic, and so nothing is objectively substance.[91]

The second way of explaining the meaning of 'substance' is more specific. It states that

> substances are a particular kind of basic entity, and some philosophical theories acknowledge them and others do not. According to this usage, it is a live issue whether the fundamental entities are substances or something else, such as events, or properties located at space-times.[92]

This conception is connected to the notion of individual things or objects and the manner this notion is understood may be as a basic notion or it must be characterized in more fundamental terms.

The difficulty with understanding Spinoza's writings is his vocabulary. This has its origin in scholasticism, which in turn has its origin in Aristotle. The seventeenth century use of 'substance' runs back to Aristotle, who considers this notion mainly in the *Categories* and *Metaphysics Z*. Aristotle was probably the most outstanding pupil of Plato. However, he did not continue Plato's teaching of Forms and Ideas. Aristotle attached importance to cognition and empirical experiences. Something like 'idea' could not exist in Aristotle's world as it was too general. He claims that the idea had to be the pattern for too many subjects. For example, the idea of 'dog' had to describe the infinite amount of different dogs, which is impossible to imagine, or it leads to the conclusion that every single dog has its own idea – which breaks the theory of ideas, because from the conception they have to be something general. According to Aristotle, the knowledge of the subject comes from itself or is even included in it.[93]

After rejecting Plato's conception, Aristotle had to find something to 'fill up the gap', because something that makes subjects to be what they are, has to exist necessarily. If

[91] ibid.
[92] ibid.
[93] Aristotle, *Metaphysics. Books Zeta, Eta, Theta, Iota (VII-X)*, (Indianapolis: Hackett Publishing Company, 1985), p. 1-21.

ideas are not almost impossible to know (at least empirically), and all subjects are individual, the answer lies in themselves. The knowledge of subject comes from the analysis of its characteristics, from the empirical experience supported with logical reasoning. There is implication that the essence of the subject is inseparably connected to it. Or even more, there is no characteristic or part of this subject that is more important than this one that decided on its existence and on what this subject is.[94] Aristotle stated that fundamental part of the being is present in it and called it 'substance'. The definitions of substance appears in *Metaphysics*, where they are 'items that can be subjects of predication and can undergo change, i.e., they can maintain an identity while having mutually contradictory properties at different times' and it is enriches in the *Categories* with the clause '[…] which cannot be predicated of anything else'.[95]

Aristotelian definition of substance is essentially connected with the notion of independence and identity. A substance is a subject of a predicate, but simultaneously is not a predicate of anything else. And a substance can have different predicates attached to it and undergo different changes, however, it holds onto its identity. These two very important parts of the definition of substance – independence and identity – are present in Spinoza's understanding of this term. This 'substance' which is used by Descartes, and then even more by Spinoza and Leibniz, is derived from Aristotle's *Categories*.[96]

There are some basic differences between Spinoza's and Descartes' understanding of substance. The system used by Spinoza belongs to traditions started by Parmenides – there is only one substance, while

> Descartes admitted three substances, God, and mind and matter; it is true that even for him, God was, in a sense, more substantial than mind and matter, since he had created them, and could, if he chose, annihilate them.[97]

In fact, we can say, that Descartes distinguished two kind of substance: infinite substance – God, and created or finite substances that together with properties or qualities make up three levels of reality. Substance is known through attributes and for Descartes there are two main attributes that can explain all the possible modes (properties or qualities) –

[94] Russell, B., *History of Western Philosophy* (Aylesbury: Book Club Associates, 1979), p. 175-180.

[95] Bennett, J., *A Study Of Spinoza's Ethics* (Cambridge: Cambridge University Press, 1984), p. 55.
[96] ibid.,
[97] Russell, B., *History of Western Philosophy* (Aylesbury: Book Club Associates, 1979), p. 553.

extension and thought. Spinoza claims, that there is one substance which has infinite attributes, so both extension and thought are attributes of God, while 'for Descartes, extension is the essence of matter'.[98]

Spinoza considers the notion of substance in his book *Ethics*. *Ethics* is very organized and clear with its geometrical structure. Every definition expresses logical and true idea. Using these true ideas and deducing logical conclusion, it is not possible to make mistakes. Spinoza writes that 'the order and connection of ideas is the same as the order and connection of things'.[99] Logical deduction of conclusions from the definitions and axioms is at the same time deduction that brings knowledge about the world. *Ethics* begins with the argumentation of the nature of the substance.

Spinoza defines substance as 'that which is in itself, and is conceived through itself: in other words, that of which a conception can be formed independently of any other conception'.[100] Substance understood in this manner is *causa sui* – cause of itself. To prove this, Spinoza put together the definition of substance with the axiom stating that knowledge of the effect depends on the knowledge of the cause.[101] If the substance was made by something else (so it would not be *causa sui*), then, according to this axiom, to get to know this substance, it would be necessary to get to know its cause. However, this leads to nonsense. In a situation like this, substance could not be substance, which (according to definition) is cause of itself, and it is not comprehended by some other cause. Thus, substance is dependent only on itself and its existence does not depend on any other exterior cause.

Substance exists. According to the author of *Ethics*, it can be proved using the definition of cause of itself. By cause of itself Spinoza means that, what essence includes existence and what nature can be comprehended only as existing.[102] Substance, being *causa sui*, has to exist out of necessity.

Substance, according to Spinoza, is infinite. To prove this, he calls the definition a finite thing. This definition advocates that this thing is finite, which can be limited by the other

[98] ibid., p. 565.
[99] Spinoza, B., *The Ethics* (Teddington: The Echo Library, 2006), p. 28. [P.II, Prop. vii.]
[100] ibid., p. 1. [P.I, Def. III]
[101] ibid. [P.I, Ax. IV]
[102] ibid. [P.I, Def. I]

thing of the same nature. Two things with different natures do not have anything in common, so they cannot limit themselves. For instance, the body is not limited by thought, neither thought by body. It results from this, that the substance could be limited only by another substance of the same nature, attribute (by attribute Spinoza means 'that which the intellect perceives as constituting the essence of substance').[103] However, in the opinion of Spinoza, this would be preposterous, since it is not possible to distinguish two substances with the same attributes. As having the same attributes makes two substances indistinguishable, that is a nonsense to treat them as two – they are just one and the same. Since there cannot be two or more substances having the same nature (so they could limit themselves and be finite from definition), substance has to be infinite. On the other hand, Descartes makes a split between infinite and finite substance, thus he is limiting God. God is separate and transcendent in relation to the world (the separation between the creator and that which is created), so if he is opposed to the created world (with its own independent existence), simultaneously he is limited. The problem with Descartes' philosophy is the fact that he needs a theological definition of God, because without it, his whole metaphysics would collapse. On the other hand, according to Spinoza, God is immanent and not a transitive cause of things.

Substance is indivisible. Spinoza argues that by considering consequences from the opposite standpoint, if it were true that substance is divisible, there are two possibilities. Firstly, substance is divided into parts that preserve its nature, or secondly, its nature will not belong to these parts. The first possibility has to be rejected, because as a result of the division few substances with the same nature would be received, and as it was already proved, the existence of substances like this is not possible. The second possibility also has to be rejected. If the parts of substance do not have its nature, then 'substance absolutely infinite could cease to exist, which (by Prop. xi) is also absurd', and this contradicts the thesis of the existence of substance out of necessity.[104]

For Descartes, there cannot be one substance. This would imply that God is extended. And according to Descartes, extended matter is divisible, which implies destruction and thus, an imperfection. However, Spinoza argues that divisibility does not have to mean destruction, because 'there cannot exist in the universe two or more substances having

[103] ibid. [P.I, Def. IV]
[104] ibid., p. 7. [P.I, Prop. xiii.]

the same nature or attribute'.[105] For Spinoza, divisibility of matter is a mode, and in essence, matter is not divisible.

Substance is God. Spinoza argues that the definition of God is 'by God, I mean a being absolutely infinite – that is, a substance consisting in infinite attributes, of which each express eternal and infinite essentiality'.[106] The consequence of the above proposition explaining that except for God no substance can exist. The proof of this is in principle the replica of the proof of impossibility of existence of two or more substances. According to the definition, God has all attributes expressing substance, so if there were any other substance, it would have to be explained by some of God's attributes. As a result, there would be two substances with the same attribute, which obviously cannot exist.

For Spinoza, God is equal to Nature or World, while there is a split in being in the philosophy of Descartes. This split is caused by Descartes' idea of creation. Spinoza rejects this split in his proposition:

> God is the indwelling and not the transient cause of all things. Proof. – All things which are, are in God, and must be conceived through God (by Prop. xv.), therefore (by Prop. xvi., Coroll. i.) God is the cause of those things which are in him.[107]

So put simply, God is not outside nature, God is nature. Spinoza is not rejecting Descartes' philosophy. He just takes Descartes' metaphysics to its logical conclusion, rejecting a theological God and anthropomorphism.

According to Spinoza, God-substance is eternal. As he writes, 'by eternity, I mean existence itself, in so far as it is conceived necessarily to follow solely from the definition of that which is eternal'.[108] As it is already known, to the nature of God-substance belongs existence. Thus, from the definition of God-substance, he exists. Putting this together with the definition of eternity, results in the thesis that God is eternal. However, this 'eternity' is equal to existence and it should not be mistaken for duration or very long time of duration

[105] ibid., p. 2. [P.I, Prop. v.]
[106] ibid., p. 1. [P.I, Def. VI]
[107] ibid., p. 12. [P.I, Prop. xviii]
[108] ibid., p. 1. [P.I, Def. VIII]

– eternity is existence out of time. Thus, substance is eternal and simultaneously atemporal.

It is worth underlining the fact that the author of Ethics does not confine himself with showing the connection of existence to the essence of God, but he heads towards the direction of identifying these two things. 'The existence of God and his essence are one and the same' says Spinoza in his proposition.[109] He starts with the statement that God is eternal. Since God is eternal, everyone with his attributes expresses the existence (which is based on the definition of eternity, which is the equal of existence). Using the other words from the definition expresses the essence of substance, and the substance is eternal, which means that expressing its essence also expresses its existence. Thus, the existence of God and his essence can be indentified – that which makes up the essence of God is the same as that which makes up his existence.

God-substance comprehended in this manner is perfect. According to Spinoza, the category of perfection is connected with the category of existence. He claims that every individual thing tries to remain in own being, aims for self-preservation and remains in its existence. Something can be perfect absolutely only if it exists absolutely – something in which essence and existence are the same. This condition is fulfilled by God-substance.

'Spinoza defines God in terms of substance and he defines both substance and mode in terms of two other notions that are undefined: being in a thing and being conceived through a thing'.[110] To sum up, God necessarily exists (Prop. xi.), God is unique (Prop. xiv. and Coroll. i., ii.), God acts solely from the necessity of his nature (Prop. xvi., Prop. xvii.), he is the free cause of all things (Prop. xvii. Coroll. ii.), all things are in God and depend on God (Prop. xv.) and all things are predetermined, no by God's free will, but by God's absolute nature (Prop. xvi., Prop. xxix., Prop. xxxii Coroll. i., Prop. xxxiii.).[111]

That which reason gets to know of substance as determining its essence is called by Spinoza 'attribute'. It has to be underlined that what Spinoza talks about is the essence of substance, not the substance itself – reason cannot get to know the substance in itself. One of the first propositions of the *Ethics* advocates is that 'each particular attribute of one

[109] ibid., p. 13. [P.I, Prop. xx.]
[110] Jarrett, C., *Spinoza. A Guide for the Perplexed* (London: Continuum, 2009), p. 42.
[111] ibid.

substance must be conceived through itself'.[112] The concept of an individual attribute cannot include in itself any other concepts, through which it could be linked to another attribute. For example, it is not possible to talk about attributes as 'existing'. What is more, God is substance of an infinite number of attributes, which means that there is infinitely many attributes. Laura Weed points out that

> Mentality and Physicality are two of monistic Substance's infinite attributes, according to Spinoza. Substance is not limited to these two attributes, but contains all attributes that are possible and conceivable by God, of which there are an infinite number.[113]

Weed sees a resemblance of Spinoza's attributes in the many-worlds interpretations of quantum physics developed by Hugh Everett. This interpretation is simply explained by John Gribbin as follows:

> Everett's interpretation is that the overlapping wave functions of the whole universe, the alternative realities that interact to produce measurable interference at the quantum level, do not collapse. All of them are equally real, and exist in their own parts of 'superspace' (and supertime).[114]

This means that when a measurement is taken at the quantum level, observation leads to the selection of one of these alternatives. Thus, one alternative becomes a part of the so called 'real' world. When this measurement is taken, all the alternatives are separated and

> each alternative reality containing its own observer who has made the same observation but got a different quantum 'answer' and thinks that he has 'collapsed the wave function' into one single quantum alternative.[115]

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[112] Spinoza, B., *The Ethics* (Teddington: The Echo Library, 2006), p. 4. [P.I, Prop. x.]

[113] Weed, L.E., *Spinoza, Leibniz and Quantum Mechanics* (Salzburg, 2007)

< http://www.learningace.com/doc/5032964/fe7e963a9ec6ac70f078659214157916/quantummindspinoza-leibnizpaper> [accessed 08 May 2011]

[114] Gribbin, J., *In Search of* Schrödinger's *Cat. Quantum Physics and Reality* (London: Black Swan Book, 1984), p. 237.

[115] ibid.

Weed suggests that Everett, like Spinoza, considers that 'perspective, not causation, joins the inherently unrelated layers of reality into a monistic thing. Observers create local realities out of universal possibilities'.[116]

Spinoza uses the same vocabulary as Descartes. In Descartes' philosophy we also find attributes, the same as substance and modes.

> We learnt that a particular thing is a substance by first observing that it has some qualities and then interfering that it is a substance, by the premises that whatever has observed qualities is a substance: "if we perceive the presence of some attribute, we can infer that there must also be present an existing thing or substance to which it may be attributed.[117]

Spinoza also defines 'mode'. It is 'the modification of substance, or that which exists in, and is conceived through, something other than itself'.[118] Only substance and its modes exist in reality. Modes are in substance, the substance is their cause and it is not separated from them. However, they are not parts of infinite substance and substance is not the set of modes. It is important that they belong to the sphere *natura naturata* (nature created) and not to *natura naturans* (nature creating) – they do not have cause in themselves. Weed states that:

> Quantum mechanics proposes a universe in which epistemological access to information is skewed by the perspective of an observer. Each particle experiences the space-time of its own light cone, but particles moving in other light cone may not be accessible at all, or may be so only through black holes or worm holes, that radically alter whatever passes into them.[119]

She compares that to the Spinoza's human modes which knows only two attributes in which they participate – the physical and the mental. She claims that 'we cannot even

[116] Weed, L.E., *Spinoza, Leibniz and Quantum Mechanics* (Salzburg, 2007) < http://www.learningace.com/doc/5032964/fe7e963a9ec6ac70f078659214157916/quantummindspinoza-leibnizpaper> [accessed 08 May 2011]
[117] Cottingham, J., *The Cambridge Companion to Descartes* (Cambridge: Cambridge University Press, 1992), p. 160.
[118] Spinoza, B., *The Ethics* (Teddington: The Echo Library, 2006), p. 1. [P.I, Def. V]
[119] Weed, L.E., *Spinoza, Leibniz and Quantum Mechanics* (Salzburg, 2007) < http://www.learningace.com/doc/5032964/fe7e963a9ec6ac70f078659214157916/quantummindspinoza-leibnizpaper> [accessed 08 May 2011]

know the manner of the unity that connects these two attributes within ourselves' and later that 'no human can see the whole of which we are a minute part'.[120]

According to the author of *Ethics*, only substance exists necessarily and by its own self-sufficiency. The substance is the cause of itself, is eternal, infinite and indivisible. These and other features of the substance link together in determining themselves. Infinite God is identified with nature and includes in itself all beings, all reality. Whatever exists, is in God and nothing can exist or be comprehended without him.

Although Spinoza identifies *natura naturans* with *natura naturata*, it should be remembered that *natura naturans* is the cause of the *natura naturata*. In other words, God being identified with nature, is at the same time the cause of its existence. The essence of things created by God-substance does not include existence, they cannot be the cause of themselves.

What is interesting, with all the clarity of Spinoza's argument, is that it seems that in a logical series of propositions the existence of finite modes does not have justification. In other words, it is difficult to find some clarification, which would explain the principle of moving from infinite substance to finite modes.

[120] ibid.

# Chapter 3

## 3.1. Quantum mechanics.

The relationship between consciousness and matter has been analysed from a different point of view, since philosophers and scientists started to assimilate the implications of quantum physics. For example, David Hodgson states that mental and physical events are aspects of manifestations of the same events of the brain-mind and there are some discoverable correlations between them. He claims that macro-physical events of neural firings are aspects of micro events in the quantum world, which indicates that mental events are more closely related to quantum events than to the neural firings themselves.[121] Similarly, Roger Penrose argues that quantum theory can be effectively applied to explain consciousness. His views are under the strong influence of the nature of creativity, mathematical insight and the idea of a Platonic reality beyond mind and matter. However, his non-algorithmic mathematical materialism is often criticised to be obscure and lacking in evidence.[122] On the other hand, Amit Goswami applies quantum theory of consciousness to the mind-body problem in monistic idealism. Goswami's views on quantum theory and monistic idealism are the combination of the aspects of quantum physics with the mental monist view that there is a living consciousness being which we take to be physical reality, but is in fact an emergent epiphenomenon. [123]

Our knowledge is changing, which simply means that philosophy also has to be changed. Since the development of quantum theory has very recently brought a fresh insight into the science, some of the theories of the mind and the body correlation should be reconsidered. However, this project deals more with the implications of science for the philosophy of mind and mind-body problem than the science itself.

Quantum mechanics arose as a new branch of physics at the beginning of the 20th century. 'Quantum' means a particular amount, the smallest particle of physical entity that can be changed in an interaction. 'Mechanics' is the branch of knowledge which considers the behaviour of physical bodies under the influence of forces or displacements. It is simply the study of movement. Thus, quantum mechanics is concerned with examination of movements of particles. Quantum

[121] Hodgson, D., *The Mind Matters* (Oxford: Clarendon Press, 1991), p. 381.
[122] Penrose, R., *Makroświat, Mikroświat i Ludzki Umysł* (Warszawa: Prószyński i S-ka, 1997), p. 103.
[123] Hamilton, C., 'Scientific Proof of the Existence of God. An interview with Amit Goswami', *What is Enlightment?*, 11 (1997) <http://www.enlightennext.org/magazine/j11/goswami.asp> [accessed 15 December 2012].

theory claims that nature is made of quanta and quantum mechanics which studies this phenomenon.[124]

What is important, quantum mechanics does not replace Newtonian physics; it is just its peculiar case. Thus, there is no need for complete abandonment of classical physics. While Newtonian laws work well for the observable world and can still be applied to objects on a big scale, quantum mechanics helps to understand that this view of nature is not enough to explain everything that can be observed, and there has to be worked out new, broaden outlook. For example, there is not natural place for consciousness in classical physics. It describes the physical universe with the use of particles and local fields that are governed in time and space by certain laws of motion. This system is 'logically complete in the sense that it does not logically require, for its description of nature, any things beyond the dispositions of the particles and local fields'.[125]

It has to be underlined, that there is a widely misunderstood idea of the application of quantum mechanics:

> It is sometimes suggested that quantum theory governs only the behaviour of very small things – like electrons. If quantum theory tells us that these things will behave strangely, that should not concern us. The behaviour of very small things 'averages out' in the familiar observable world of medium-sized objects.[126]

However attractive it might seem, it is not true. Quantum mechanics studies the invisible world of atoms, but they are the basis and building material of the whole universe and they govern everything around. Quantum effects cannot be separated from the everyday world, because they are part of it. Quantum theory 'tells us that a physicist who observes an electron go into a particular quantum state, himself goes into that state, and so does everything in a physicist's world'.[127] What is more, Copenhagen interpretation of quantum mechanics (named after the physicist Neils Bohr, whose work was mostly conducted in Copenhagen) claims that what is described by quantum mechanics is not important, and certainly it does not aim at providing a picture of the physical world itself. What is really

[124] Zukav, G., *The Dancing Wu Li Masters. An Overview of the New Physics*(London: Rider, 1979), p. 40-69.

[125] Stapp, H.P., *Mind, Matter and Quantum Mechanics* (New York: Springer, 2009), p. 39.
[126] Heil, J., *Philosophy of Mind. A Guide and Anthology* (Oxford: Oxford University Press, 2004), p. 816.
[127] ibid.

substantial, quantum theory is about the correlation between various observations and what can be observed in specific conditions. Bohr and Heisenberg, the principal founders of quantum theory, insisted that 'the theory must, strictly speaking, be viewed as merely a set of rules for making predictions about observations obtained under certain special kinds of experimental conditions'.[128] According to Copenhagen interpretation, it is important that quantum mechanics works in all possible experimental situations.[129]

Quantum mechanics is a real challenge to materialism, because 'it reveals that matter has far less "substance" than we might believe', and secondly, because according to it, the observer makes a difference to what is observed.[130] Erwin Schrödinger's famous thought experiment is confirmation of this thesis.

A cat, Tibbles, is locked in a tight box, in which there is a radioactive substance and Geiger-Müller counter. When the radioactive decay of a radium atom begins, the counter will activate the mechanism with poison sufficient to kill the cat. It has to be supposed, that in the time in which the experiment is carried out, radioactive decay may happen with 50% probability and with the same probability it may not happen. Quantum mechanics governs the decay, which means that the radioactive atomic nucleus is in a state of superposition of the state responsible for decay and the state without decay. If the Geiger-Müller counter records the decay, the poisonous substance is released and Tibbles dies. However, decay occurs with 50% probability, which means that the cat is dead or alive with 50% probability. According to Copenhagen interpretation of quantum mechanics, the state of the cat will be determined only after carrying out the measurement – looking into the box. The cat's wave function will collapse – it will contract to the state of alive cat or dead cat. Until that time, Tibbles is in a quantum state of superposition: a mixture of life and death.[131]

[128] Stapp, H.P., *Mind, Matter and Quantum Mechanics* (New York: Springer, 2009), p. 40.
[129] Zukav, G., *The Dancing Wu Li Masters. An Overview of the New Physics* (London: Rider, 1979), p. 40-69.
[130] Davies, P., Gribbin, J., *The Matter Myth. Beyond Chaos and Complexity* (London: Penguin Books, 1991), p. 8.
[131] Gribbin, J., *In Search of Schrödinger's Cat. Quantum Physics and Reality* (London: Black Swan, 1991), p. 203-208.

Quantum superposition defines the collection of all possible states that an object can have. 'The world is in a superposition of states until it is observed'.[132] This is colloquially known as 'consciousness causes collapse' – a conscious observer carrying out observations makes the wave function collapse. This means, the world can be in any configuration and any possible arrangement of particles or fields. Thus, quantum theory 'seems to place minds outside the material world. If minds were themselves parts of material world, they would be […] merely parts of the whole system, hence themselves in a superposition of states'.[133] What is more, any consciousness can reduce the quantum states. Nevertheless, the more primitive would be the conscious organism, its power would be less in causing the collapse of the wave function. In the case of Schrödinger's experiment, 'the cat's awareness of the click of the Geiger counter or the breaking of the poison container would (assuming error-free connection to the micro observable) eliminate the potentiality of no-decay of the radioactive substance – although the cat would not know this'.[134]

Contrary to Newtonian physics, quantum mechanics shows that knowledge of the subatomic world lies far away from what is supposed to be true. Furthermore, it is not possible to predict atomic phenomena. The only thing that can be predicted is its probability. 'Quantum theory is a procedure by which scientists predict probabilities that measurement of specified kinds will yield results of specified kinds in situations of specified kinds'.[135] From a philosophical point of view, quantum mechanics causes important implications. For example, it not only comes out against determinism and claims that people have influence on the reality around them, but it states that people create reality to some extent. The nature of particles allows the observer to know its momentum or position, but never these two quantities at the same time. This means that the observer has to decide which of these two features to measure. From the metaphysical side, the observer creates some of the particle's properties, because he has decided to measure them. Or differently, something that has position (for: example a particle) is created because there is an observer who wants to determine its position and it is impossible to determine the position, if there is nothing, that can be in this position.[136] In the beginning there was nothing. Somehow from this nothing came everything. Out of this nothingness

[132] Heil, J., *Philosophy of Mind. A Guide and Anthology* (Oxford: Oxford University Press, 2004), p. 817.

[133] ibid.
[134] Hodgson, D., *The Mind Matters* (Oxford: Clarendon Press, 1991), p. 332.

[135] Stapp, H.P., *Mind, Matter and Quantum Mechanics* (New York: Springer, 2009), p. 53.
[136] Zukav, G., *The Dancing Wu Li Masters. An Overview of the New Physics* (London: Rider, 1979), p. 53-54.

matter, energy, space, time, consciousness, mind emerged. How is it that something as unconscious as the matter of the brain can ever give rise to something as immaterial as experience? A well-known physicist at Princeton, John Wheeler, wrote in his *Gravitation*:

> May the universe in some strange sense be 'brought into being' by the participation of those who participate? […] The vital act is the act of participation. 'Participator' is the incontrovertible new concept given by quantum mechanics. It strikes down the term 'observer' of classical theory, the man who stands safely behind the thick glass wall and watches what goes on without taking part. It cannot be done, quantum mechanics says.[137]

That is the point, where new physics with quantum mechanics in the front starts to be very similar to eastern mysticism.

According to the measurement problem, an atom only appears in a particular place if it is measured. In other words, an atom is spread out all over the place, until the conscious observer decides to look at it. Thus, the act of measurement or observation creates the entire universe. Only conscious beings can be observers, then ultimately becoming strongly connected to the very existence of reality. Without them there will be only this expanding superposition of possibilities without anything definite ever really happening. However, 'until the measurement is made, all the possible results remain possible: so the question arises, at what stage in a process of measurement can it be said that the measurement is actually made, so that a particular result becomes actual and the other possibilities are eliminated?'.[138] The physicist Eugene Wigner suggested that 'it only occurs when the person making the measurement actually becomes conscious of the result'.[139]

Consciousness that causes collapse brings clear indication between 'observed system' and 'observing systems'. 'If measurement is effected by the first registration on human consciousness, then it is not surprising that the mathematics of quantum physics, dealing with the objective world, does not represent it'.[140] However, there are three problems with this viewpoint.

[137] ibid., p. 54
[138] Hodgson, D., *The Mind Matters* (Oxford: Clarendon Press, 1991), p. 92.

[139] ibid.
[140] ibid., p. 329.

Firstly, as has already been said, the act of observation creates and determines the results. Nevertheless, 'to avoid solipsism, on the one hand, and different values of observables being disclosed to different persons, on the other hand, one has to suppose that registration of a measurement on the consciousness of one person reduces the state so as to show a definite value so far as everyone is concerned'.[141] Thus, if one observer opens Schrödinger's box and affirms that the cat is dead, he has to make that fact the only possible result for everybody else who looks into the box. The question is, how one consciousness can influence other consciousnesses and cause the collapse of the state for both of them.

Secondly, it has to be considered, that the first person that opens box judges the state of the cat wrongly (for example: the cat is sleeping, while considered to be dead). 'Surely the observation which is thereby mistaken does not determine the value to which the state collapses; and equally surely it could not reduce the state to the correct value which is not observed'.[142] Thus, how is the accuracy determined when measuring observation.

Finally, what happens in a situation when the measurement is taken by some sort of machine. 'A measuring instrument is applied to a system, no one looks at the reading, but two photographs are taken, one after the other. A person then looks at the second photograph taken'.[143] Can this measuring device cause collapse of the wave function? 'It seems *prima facie* implausible that some one of these three events could reduce the state function for all persons and all purposes'.[144]

The objective solution to the problem of measurement consists of indeterminism and the 'non-materiality' of matter. According to indeterminism, all physical measurements, Newtonian laws or physical phenomena cannot bring permanent views of the world and cannot predict the events. They can only give probabilities for individual micro events and, moreover, 'that does not necessarily involve indeterminism for macro events, it can do so'.[145] In addition, the function of the 'non-material' views of matter does not deny the existence of macro objects and

[141] ibid., p. 330.

[142] ibid., p. 330.
[143] ibid.
[144] ibid., p.331.
[145] ibid., p.375.

macro events of people's experience, but rather suggests that 'in certain respect their fundamental nature is not as we assume it to be'.[146]

What is more, Michael Lockwood, considering quantum mechanics and the conscious observer, suggests that one of the possible philosophical consequences for the measurement problem is the abandonment of realism. For example, the Schrödinger's cat experiment fails to satisfy the common-sense intuitions, where the cat must be dead or alive regardless of the actions of the observer. Because realism 'is the view that reality transcends experience, that propositions can be true or false, independently of our being in a position to tell which they are'.[147] The limitations of our physical knowledge that could lead from realism to idealism, would be considered together with the discussion on the monistic idealism suggested by Amit Goswami in the section 7.4. of this chapter.

On the other hand, Huw Price in his article 'A Neglected Route to Realism about Quantum Mechanics' underlines the philosophical meaning of Bell's Theorem and also tries to reconcile the existence of the 'metaphysical advantages' such as locality and Einsteinian realism to the existence of the free will.[148] Price is an Australian philosopher and physicist, who mostly considers asymmetry of the time and the philosophy of physics and pragmatism in his works. He says that 'nature has offered us a metaphysical choice of an almost Faustian character. We may choose to enjoy the metaphysical good life in quantum mechanics, keeping locality, realism, and special relativity – but only so long as we are prepared to surrender our belief in free will!'.[149]

Price states that 'an exceptionally promising route to a satisfying resolution of some of the most profound puzzles in the history of science lies unexplored and almost unnoticed'.[150] The author's intention is to explain how to avoid the challenge to local realism made up by Bell's Theorem and show the significant consequences it brings for both physicists and philosophers. According to Price, this can be achieved by reinterpreting the formal possibilities in terms of backward causation.

[146] ibid.
[147] Lockwood, M., *Mind, Brain and the Quantum* (Oxford: Blackwell, 1991), p. 219.

[148] Price, H., 'A Neglected Route to Realism about Quantum Mechanics', *Mind. A Quarterly Review of Philosophy*, 411 (1994), 303-336.
[149] ibid., p. 304.
[150] ibid., p. 307.

> Instead of taking the prior state of the physical system in question to 'constrain' the experimenter's choice, we may reasonably take the latter's choice to affect the prior state of the physical system. The mathematics thus remain the same as in Bell's proposal, but we give it a different metaphysical gloss.[151]

Price admits that the backward causation in quantum mechanics is still a rather unpopular view and in his article he also tries to diagnose and treat this intuitive resistance. However, he underlines that the article is 'not offering the formal details of an interpretation or extensions of quantum mechanics which embodies these ideas'.[152] The aim of the article is to try to clear away some difficulties of quantum mechanics not in the technical, but in the conceptual sense.

Firstly, the author accesses 'the first-order case for the backward causation approach'. He starts with a rather informal account of Bell's Theorem and the Einstein-Podolsky-Rosen Paradox on which it is based. Price says that Einstein – as a supporter of realism – wanted to prove that the measurement problem in quantum mechanics was merely epistemological. According to the author,

> he disliked the Copenhagen view that the nature of reality could depend on what humans choose to observe, and believed that the features of quantum mechanics that Bohr and others took as evidence of deep entanglement between observation and reality were really a reflection of the fact that the theory gives only a partial description of reality. As he saw, the crucial question is therefore whether the quantum mechanical description of reality can be considered to be complete.[153]

Using the thought EPR experiment, it was concluded that the quantum theory cannot be complete, mainly because quantum variables need to have been established values before any measurement, while quantum mechanics gives only probabilities of the values. However, Bell's Theorem shows that the manner in which quantum mechanics predicts is different from classical intuition and no physical theory of hidden variables can reproduce all of the predictions of quantum mechanics. Bell proved that the EPR Paradox never really existed because from the very beginning it was internally contradictory.

[151] ibid., p. 304.
[152] ibid., p. 306.
[153] ibid., p. 307.

Moreover, Price considers Doppelgänger's Twin Paradox and its relation with the notion of free will. Since in this example, according to 'the principle of the relativity of simultaneity, there was no determinate sense in which one interrogation took place before the other. How then could it be a determinate matter of whether interrogation 1 influenced interrogation 2, or vice versa?'.[154] If it is considered that twins do not possess the power of telepathy, but precognition of what questions they are to be asked, it deprives the police of the freedom to choose what questions to ask. However, Price suggests using advanced action in this case and interpret it in terms of backward causation with the use of Bell's Theorem that seemingly denies free will. He opts for the case where hidden variables depends both on the fate and the history of the agents concerned. The author says that

> this advanced action proposal does not conflict with special relativity. This is because the point at which twins become coupled – whether their conception, their birth, or some later meeting – lies well within the light-cones of both their later interrogations. The effect is not instantaneous and not at a space-like distance. And it needs no mysterious carrier. It has the twins themselves, who bear the marks of their future as they bear the marks of their past.[155]

There are two main objections to the advanced action interpretation. First, it is a new version of 'bilking argument', which Price treats very briefly and disproves by saying, that even if something is 'already determined/written' it does not mean it is 'accessible'. Secondly, there is the fatalist objection, which can be briefly summarised by the sentence that 'there is a set of true propositions about the future and there is no human able to prevent it from occurring, thus everything that will happen in the future is already unavoidable'. Nevertheless, there are sometimes propositions about the future that are neither true nor false and it is possible for a proposition to have different truth values at different times, even if, Price says that modern physicists have more than enough reasons to reject that possibility.[156]

Price claims that 'the relationship between causation and physical theory is itself obscure and philosophically problematic, it is very far from obvious what the backward causation proposal actually amounts to, in physical terms'.[157] According to the notion of backward causality, the effect precedes its cause temporally, but not causally. Thus the concept of

[154] ibid., p. 311.
[155] ibid., p. 312.
[156] Stanford Encyclopedia of Philosophy, *Time* (Stanford: Stanford University, 2008) < http://plato.stanford.edu/entries/time/> [accessed 30 May 2011]
[157] Price, H., 'A Neglected Route to Realism about Quantum Mechanics', *Mind. A Quarterly Review of Philosophy*, 411 (1994), 303-336 (p. 305).

backward causality assumes a mere contingent feature and cause and effect may reverse their order.[158] The majority of the attempts to interpret quantum mechanics has discarded the notion of causality or causal chains, mostly because of Heisenberg's Uncertainty Principle. 'Although the uncertainty relations had been derived from the fundamental equations of quantum mechanics, some influential experts began to teach quantum theory by starting out from the uncertainty relations'.[159]

Nevertheless, there is a number of experiments in quantum mechanics that consider backward causation, not only as a possibility to happen, but even as the logical explanation of the results given. Firstly, the famous Double – Slip Experiment by Thomas Young, where particles passing through two closely spaced slits are found to interfere with each other and with the observer. 'The electrons not only know whether or not both holes are open, they know whether or not we are watching them, and they adjust their behaviour accordingly. There is no clearer example of the interaction of the observer with the experiment' claims scientist John Gribbin.[160] Secondly, the more recent experiment with Bell's Theorem interpretation – Delayed Choice Quantum Eraser by Yoon-Ho Kim. This investigates further the peculiar consequences of Young's experiment. There is a sophisticated device prepared to:

> measure correlated pairs of photons, which are in an entangled state, so that one of the two photons is detected 8 nanoseconds before its partner. The results of the experiment are quite amazing. They seem to indicate that the behavior of the photons detected these 8 nanoseconds before their partners is determined by how the partners will be detected.[161]

And finally, the effect called backward masking mentioned by Roger Penrose. Penrose describes a situation, in which electrical stimulation is applied to the skin. If this stimulus lasts shorter than half a second, it is not perceived. However, 'a cortical stimulus can "backward mask" an earlier skin stimulus, indicating that awareness of the skin stimulus had actually not yet taken place by the time of the cortical stimulus. If a skin stimulus is applied shortly after such a cortical stimulus, then skin awareness is "referred back" but

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[158] Stanford Encyclopedia of Philosophy, *Backward Causation* (Stanford: Stanford University, 2010) < http://plato.stanford.edu/entries/causation-backwards/#4.3 > [accessed 30 May 2011]

[159] Gribbin, J., *In Search of Schrodinger's Cat. Quantum Physics and Reality* (London: Black Swan, 1984), p. 158.

[160] ibid., p. 171.

[161] Stanford Encyclopedia of Philosophy, *Backward Causation* (Stanford: Stanford University, 2010) < http://plato.stanford.edu/entries/causation-backwards/#4.3 > [accessed 30 May 2011]

the cortical awareness is not'.[162] Thus simply put, the subject seems to refer the perception of the stimulus touching skin backwards in time by about half a second.

Despite this fact, quantum mechanics does not consider that backward causation is consistent with this theory. What is more, 'the causal chain moving backward in time is able to explain the non-locality in quantum mechanics, consistent with the special relativity'.[163] The best way to explain it, is to use the EPR experiment once again. Firstly, two or more particles are in close connection with each other and when they are separated, their measured values of certain observables are correlated. In the cases,

> where the measurements are space-like events, special relativity prohibits a causal chain going directly through space-time from one to the other. This suggests that these measured values were a reality (or at least determined) prior to measurement, and that the stochastic measurement was not the deterministic cause of the observed reality.[164]

This implies the existence of hidden variables that determines the reality before the measurement is taken. However, there is no hidden variable the quantum mechanics that can explain the connections of the measurement taken (through the constraints of the locality condition of special relativity). What is more,

> no hidden variable theory can explain the correlation is because of the free choice of the experimenters in separable choosing of the observable of each particle to become a reality. In summary, no causal chain of contiguous events, even including hidden variables, can explain this correlation, assuming all causal chains move forward in time. Hence, the EPR correlation is called a paradox.[165]

Moreover, it is solved by backward causation. And what is even more important, 'the EPR correlations are probabilistic rather than deterministic. This implies probabilistic causation'.[166] That could also be the next argument in favour of indeterminism and free

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[162] Penrose, R., *The Emperor's New Mind: Concerning Computers, Minds, and the Laws of Physics* (Oxford: Oxford University Press, 1999), p. 571.
[163] Wharton, W. R., 'Causation with Quantum Mechanics', *American Journal of Physics* (2005) < http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.133.2208> [accessed 30 May 2011]

[164] ibid.
[165] ibid.
[166] ibid.

will. For, neither the quantum theory nor Bell's Theorem raise any new difficulties for the notion of free will. Furthermore, Bell's Theorem 'offers us a route to an Einsteinian realism about quantum mechanics which is local, and therefore compatible with special relativity; and which shares the well known advantages of the Einsteinian view that quantum mechanics is incomplete'.[167]

## 3.2. Non-algorithmic Mathematical Materialism.

Roger Penrose, English mathematical physicist, argues that quantum theory can be effectively applied to explain consciousness. His views are under the strong influence of the nature of creativity, mathematical insight, Gödel's incompleteness theorem and the idea of a Platonic reality beyond mind and matter.

To understand the place of the mind in the Penrose' ontology and the perspective with which he looks at the mind-body problem, the concept of the three worlds needs to be presented. The first of the worlds distinguished by Penrose is the world of the mathematical ideas of Plato. Mathematical beings, such as natural numbers, Turing machines, Einstein field equations or Mandelbrot sets, truly exist in that world, independently of the experiencing subject. To put it another way, that world is not created by the mathematicians, but it has an objective character and can be explored by the human mind, which makes a sense for the existence of the term 'objective mathematical truth'. Penrose, a supporter of mathematical Platonism, claims that

> the mathematical assertions that can belong to Plato's world are precisely those that are objectively true. Indeed, I would regard mathematical objectivity as really what mathematical Platonism is all about. To say that some mathematical assertion has a Platonic existence is merely to say that it is true in an objective sense.[168]

To that world also belong the ideas of goodness, truth and beauty.

[167] Price, H., 'A Neglected Route to Realism about Quantum Mechanics', *Mind. A Quarterly Review of Philosophy*, 411 (1994), 303-336 (p. 334).

[168] Penrose, R., *The Road to Reality. A Complete Guide to the Laws of the Universe* (London: Vintage, 2005), p. 15.

From that mathematical world, which exists beyond space and time, emerges the physical world, which can be described by exact science. The fact that the second world comes from the mathematical one is very important for Penrose, who treats it as proof for the hypothesis that the whole universe has a mathematical basis governing its structure very precisely by the use of timeless mathematical laws.[169] There is also the third world – the world of the mind. It includes phenomena such as consciousness, understanding or intelligence. According to Penrose, all mental events have their ultimate justification in the physical world (physicalism).

The concept of the three worlds brings the three mysteries: in what way the physical world emerges from the ideal world of the mathematics; how conscious minds can come into being in the physical world; and what provides for our minds the access to the world of ideas that is beyond time and space. What is the most important element of these concepts, is the assumption that every subsequent world emerges from a part of the previous. As an effect, the physical world comes from only the part of the rich mathematical world, and the world of mind emerges only from some structures of the physical world (responsible for the structure of the brain). Thus, only a small unit of mental activity considers the absolute ideas for the platonic world. What is more, Penrose claims that there are no mathematical truths belonging to the platonic world and no available for the conscious mind. He claims that:

> the more we understand about the physical world, and the deeper we probe into the laws of nature, the more it seems as though the physical world almost evaporates and we are left only with mathematics. The deeper we understand the laws of physics, the more we are driven into this world of mathematics and mathematical concepts.[170]

According to Penrose, the world of mathematics is the most basic grounds for reality and the physical world is not just an imperfect copy of the world of ideas.

Every following world, emerging from the part of the previous, is richer. Thus, the most complex and the richest is the world of the mind. However, Penrose does not consider these worlds to be separated from each other, but rather that they make up the part of

[169] Penrose, R., *Makroświat, Mikroświat i Ludzki Umysł* (Warszawa: Prószyński i S-ka, 1997), p. 18.

[170] ibid., p. 18-19.

some mysterious and more complicated integrity. Furthermore, he assumes that it is not possible to understand one of these three areas without evoking the other two. They should be unified within the confines of the formalism of the new physical theory, of which one of the basic features would be non-algorithmic. That non-algorithmic feature makes up the most important element connecting the mathematical world with the world of the mind.

In his book *The Large, the Small and the Human Mind* Penrose presents four different viewpoints on the relation between conscious thinking and mathematical calculations. According to the first view – the principle of strong AI, artificial intelligence, calculations determine all processes of thinking. All mental events (including the consciousness) appear when a subject carries out calculations and they depend on a correctly composed algorithm. The second viewpoint describes consciousness as a result of physical events that occur in a brain and that can be simulated by calculations. However, these calculations do not evoke consciousness. All mental events are connected inseparably to the physical structure of the brain and the biochemical processes occurring in it. Thus, the brain is made of neurons and is conscious in contrast to unconscious simulations.[171] This view is argued by John Searle, who is in favour of biological naturalism and claims that brains cause minds. What is more, Searle's famous thought experiment, the Chinese Room, is the argument against the possibility of strong AI. He said that 'consciousness is amazing product of certain kinds of human and animal brains, but it is very local and very special'.[172]

Roger Penrose is the follower of the third option – the right physical processes in a brain cause the appearance of consciousness, however, these processes cannot be simulated by calculations. This means that consciousness can be understood and explained through physics. Nevertheless, the actions of the brain cannot be simulated by the use of calculations and it is impossible to make a simulation that reconstructs the operation of the brain. Thus, there have to be some physical mechanism in a brain that works in a manner impossible to calculate. This standpoint has two poles – weak and strong. According to the weak option, known physical laws have to be precisely examined in order to find some processes that are impossible to estimate. On the other hand, strong option supporters (Penrose) claim that our physical knowledge is not enough to explain consciousness and there is a need for new physical laws. According to Penrose, these

[171] ibid., p. 99-140.
[172] Blackmore, S., *Conversations on Consciousness* (Oxford: Oxford University Press, 2005), p. 199.

'impossible to estimate processes' can be found in physical theory that connects the level of quantum theory and the level of classical science. Penrose argues that our knowledge of the physical world around us is incomplete. However, he does not say that in the future science will not be able to explain consciousness and other incomprehensible ideas.[173] He says:

> perhaps, in some sense, this is 'why' we, as sentient beings, must live in quantum world, rather than an entirely classical one, despite all the richness, and indeed mystery, that is already presented in the classical universe. Might a quantum world be required so that thinking, perceiving creatures, such as ourselves, can be constructed from its substance?[174]

There is also a fourth option which states that consciousness cannot be explained by the use of physics, mathematical calculations or any other scientific methods. Moreover, it is a mistake to search for scientific explanation of the phenomenon of consciousness. Roger Penrose argues the opposite to this and together with Stuart Hameroff has developed a theory on quantum gravity and microtubules.

Firstly, it is essential to explain how Penrose understands computability and non-computability. He uses the word 'algorithm' as a synonym of the word 'calculation'. As an example, Penrose uses Euclid's algorithm, which is used to find the highest common factor of two numbers. From the dawn of history there was many procedures of this type have been known. However the word 'algorithm' was only defined precisely in the twentieth century. The Turing's concept is the well-known definition of the term. It was created by the English mathematician, Alan Turing, as a response to the question asked by David Hilbert regarding the possibility of the existence of algorithmic procedures for solving mathematical problems (*Entscheidungsproblem*). The Turing machine is not a physical device, but an idealistic mathematical object that possesses a finite set of inner states. Despite the fact that, it is a finite number of the states, a machine can use the infinite external memory and give the results of any order.[175] According to Penrose, the Turing machine belongs to the platonic world of mathematical beings and it is an idealistic version of a contemporary computer. He states that the Turing machine can operate on numbers or *mathematical formulae*, such as algebraic or trigonometric expressions. 'All

[173] Penrose, R., *Makroświat, Mikroświat i Ludzki Umysł* (Warszawa: Prószyński i S-ka, 1997), p. 99-140.
[174] Penrose, R., *The Emperor's New Mind: Concerning Computers, Minds and the Laws of Physics* (Oxford: Oxford University Press, 1999), p. 292.
[175] Stanford Encyclopedia of Philosophy, *Turing Machines* (Stanford: Stanford University, 2012) < http://plato.stanford.edu/entries/turing-machine/ > [accessed 27 June 2012].

that one needs is some form of precise coding into sequences of 0s and 1s, of all the mathematical symbols that are involved, and then the Turing machine concept can be applied'.[176] It follows that in contrast with the computable processes, the non-computable ones cannot be realised by the use of any real computer or its idealistic version (thus, the Turing machine too).

According to Penrose, all known physical laws are fully computable, and can therefore be realised by the Turing machines. Thus, the laws governing quantum mechanics (Schrödinger equation),classical mechanics, relativity theory or the deterministic chaos belong to the computable processes. In order to show the examples of non-algorithmic understanding, Penrose uses the example of a toy model universe, where time is a discrete quantity and a state is described in a particular moment by the two polyomino sets. The evolution of this universe is fully deterministic, but at the same time not computable because 'it follows from a theorem of Robert Berger that there is not computer action which can simulate the evolution of this universe because there is no computational decision procedure for deciding when a polyomino set will tile the plane'.[177] This example proves that 'computability and determinism are different things'.[178]

Next, Penrose considers Gödel's incompleteness theorem – this is his crucial argument for the non-algorithmic mathematical insight. This theorem concerns two important aspects for the mathematics issues – the truth and the evidence. Since some correctly made sentences cannot be proved on the basis of the formal system, how can it be known that they are true. Susan Greenfield, a British scientist, explains that there are examples in mathematics where 'true propositions are obtained from procedures that are not algorithmic, not predetermined by the set of rules. In the same fashion, Penrose observes, our consciousness is governed by something more than a fixed set of rules, more than a series of algorithms'.[179] Penrose states that the concept of the mathematical truth goes beyond formalism, and that exploring it is possible through the reflection principle. He claims that:

[176] Penrose, R., *The Emperor's New Mind: Concerning Computers, Minds and the Laws of Physics* (Oxford: Oxford University Press, 1999), p. 67.

[177] Penrose, R., *Makroświat, Mikroświat i Ludzki Umysł* (Warszawa: Prószyński i S-ka, 1997), p. 119.
[178] ibid.
[179] Greenfield, S., *Journey to the Centers of the Mind: Towards a Science of Consciousness* (New York: Freeman, 1995), p. 55.

> by ‘reflecting’ upon the meaning of the axiom system and the rules of procedure, and convincing oneself that these indeed provide valid ways of arriving at mathematical truths, one may be able to code this insight into further true mathematical statements that were not deducible from those very axioms and rules.[180]

Thus, for exploring the truth there is a need for some direct insight into the world of mathematical beings. The formal operations are not sufficient measures for determining the veracity of the sentences. Penrose claims that thanks to the reflection principles going beyond formalism, the mathematicians can consider such beings as infinite sets. Since a standpoint like this demands accepting that mathematical Platonism, which is the view that the mathematical objects exist truly and beyond the time, and the concept of the truth has an absolute character and demands the insight into existing absolutely in the world of mathematical ideas.

According to Penrose, the matter of understanding in mathematics can be extrapolated to the understanding in any other discipline of the mind’s activity. There is no type of mental activity demanding the understanding that could be captured into an algorithm. The example with the mathematics shows that thinking has a non-algorithmic character and demands some insight. This non-computability can be extrapolated to the other mental events, including consciousness itself.

The arguments presented above give the detailed explanations of the part of Penrose’s conceptions of the mind. It is presented that human understanding is non-algorithmic, that mathematical insight cannot be coded in an algorithmic procedure if there is certainty of its correctness. Thus, the non-algorithmic mathematical insight implies the non-algorithmic character of human consciousness. That is how Penrose describes the relationship which occurs between the mathematical world and the world of consciousness. However, the complete analysis of the functions of the mind demands reaching the micro level, which Penrose realises by creating the model of the mind in which the quantum processes will determine a non-algorithmic manner of thought (proved already in the macro-scale). This model is crucial in Penrose’s conception and makes it possible to characterise the relationships occurring between the world of the mind and the physical world. It has to be underlined that Penrose supports physicalism. Thus, all mental events are ultimately

[180] Penrose, R., *The Emperor’s New Mind: Concerning Computers, Minds and the Laws of Physics* (Oxford: Oxford University Press, 1999), p. 144.

reduced to physical events and the mind is an emergent structure from the world of physics.

Allan Hobson, professor of psychiatry and director of the Laboratory of Neurophysiology at Harvard Medical School, admits that most neuroscientists pay more attention to philosophy than physics. Particularly, quantum theory that brings conundrums like Schrödinger's cat (whose life or death is not determinate) or Heisenberg's uncertainty principle (the location and velocity of particles cannot be determined with accuracy). Hobson says that is it common to consider philosophy as 'the conscience of the scientific enterprise and hence "above" neuroscience, while physics, with its nitty-gritty concern for the basic nature of matter, is the foundation of science and hence "below" neuroscience'.[181] Nevertheless, he underlines that quantum mechanics may be the hope of understanding phenomenon of consciousness as a state of matter. Stuart Hameroff, the anaesthesiologist and the director of the Centre for Consciousness Studies at the University of Arizona in Tucson, shares that view.

Hameroff together with Penrose collaborates on the theory that consciousness depends on quantum coherence in microtubules. According to their hypothesis, the cytoskeleton of cells is equipped with its own 'nervous system'. Penrose and Hameroff claim that the reversible consciousness loss during the anaesthetic is proof for the connection between the cytoskeleton and the consciousness. This cytoskeleton is built out of three elements: microtubules, actin and intermediate filaments. The microtubules are the protein polymers, made of tubule appearing in two forms: α- and β-tubulin dimmers (tubule is bipolar and as a protein occurs in two three-dimensional structures; thus in at least two different states). They are long cylindrical tubes, inside of which both classical and quantum calculation processes should occur.[182] Hameroff says that from the very beginning it seemed to him that 'microtubules were excellent candidates for quantum computation, that quantum computing might be happening inside nerve cells where they could be isolated'.[183] The origin of consciousness – mental activity – is determined by a non-algorithmic physical process that occurs at the point of contact between the macroscopic and microscopic structure of the brain. It is possible though that some coherent quantum activities happen inside the microtubules, and also 'extend over very large areas of the brain'.[184] This extended area of coherent quantum activities in a brain indicates the nonlocal character of

[181] Hobson, A., *Consciousness* (New York: Scientific American Library, 1999), p. 122.
[182] Penrose, R., *Makroświat, Mikroświat i Ludzki Umysł* (Warszawa: Prószyński i S-ka, 1997), p. 129-134.
[183] Blackmore, S., *Conversations on Consciousness* (Oxford: Oxford University Press, 2005), p. 120.

[184] Penrose, R., *Makroświat, Mikroświat i Ludzki Umysł* (Warszawa: Prószyński i S-ka, 1997), p. 133.

consciousness. Finally, the global quantum state controls the computations that occur along the microtubules and at the same regulates the synaptic transmissions. Moreover, Hameroff adds that our conscious and subconscious minds are comprised of quantum information. At the moment of death, that information does not completely disappear, but rather stays because of the quantum entanglement. Hameroff claims that it 'stays in quantum superposition and does not undergo quantum state reduction or collapse, it is more like our subconscious mind, like our dream. And because the universe at the Planck scale is non-local, it exists holographically, indefinitely'.[185] It could be this, what is generally considered as a soul.

Non-algorithmic mathematical materialism and the theory that consciousness is neurophysiologically realised as gravitation-induced reduction of coherent superposition states in microtubules are criticised as being obscure. First of all, Penrose's interpretation of Gödelian arguments does not confirm the thesis of non-algorithmic manner of human thinking. Moreover, one cannot prove one's own non-contradiction. As Chalmers formulates, 'one might have thought that the deepest flaw lay in the unjustified claim that one can see the soundness of certain formal systems that underlie our own reasoning'.[186] The premises from Penrose's argument generate the contradiction, since 'we cannot know unassailably that we are sound'.[187]

Penrose and Hameroff approach brings some major difficulties with empirical confirmation. Additionally, the whole process of gravitation-induced reduction happens in an extremely sophisticated manner. The notion of quantum theory of gravity itself is still not fully developed. In fact, there is no agreement among the scientists, how to get that theory. There is string theory, which is preferred by a majority of physicists. It 'melds gravity and quantum mechanics by arguing that everything in nature arises from the vibration of tiny strings in 10-dimensional space-time'.[188] On the other hand, there is loop quantum gravity theory that 'shows mathematically that space-time is woven out of loops in gravitational field lines'.[189] Nevertheless, both of these theories lack evidence. Furthermore, Max Tegmark, a Swedish-American cosmologist and a professor at the Massachusetts Institute of Technology, completely refuses to accept the possibility of the participation of coherent macroscopic quantum states in mental processes. According to

[185] Blackmore, S., *Conversations on Consciousness* (Oxford: Oxford University Press, 2005), p. 124.
[186] Chalmers, D., *Minds, Machines, and Mathematics* (Tuscon: University of Arizona, 1995) < http://consc.net/papers/penrose.html> [accessed 27 June 2012].
[187] ibid.
[188] Ananthaswamy, A., 'The Light That Came Late', *New Scientist*, 2721 (2009), 26-30 (p. 28).

[189] Ibid.

Tegmark, it is impossible because the microtubules are not screened enough from the influence of the environment. He claims that the 'decoherence calculations have indicated that there is nothing fundamentally quantum mechanical about cognitive processes in the brain'.[190] Moreover, Tegmark suggests that the 'computations in the brain appear to be of a classical rather than quantum nature'.[191]

Penrose, as a supporter of physicalism, assumes that all mental processes can be reduced to physical events. This assumption makes up the basis of the relationships between the physical word and the world of consciousness in the ontology he worked out. However, Nancy Cartwright, professor of philosophy, logic and scientific method at the London School of Economics and Political Science, suggests that mental events are the subject of biological examination and need to be subordinate to biological laws. According to her, physics or chemistry can be helpful and provide some answers to the questions of a biological nature. Nevertheless, it is not possible to explain the functions of the human brain without biological analysis. Cartwright notices that Penrose's conception of the mind and physicalism generally is very popular among physicists. She states that physicists claim that physics can provide them with all ultimate explanations without the need to evoke chemistry or biology.[192]

### 3.3. Co-operating Conscious Subsystems.

David Hodgson is one of the philosophers that states that quantum physics and consciousness are related, even if the details are not completely clear. Hodgson is a Judge of the Supreme Court of New South Wales and the author of numerous philosophical articles (mostly dedicated to the philosophy of the mind): *Consequences of Utilitarianism* (1967) and *The Mind Matters: Consciousness and Choice in a Quantum World* (1991), both published by Oxford University Press. In *The Mind Matters*, Hodgson considers whether or not our conscious minds exert a non-physical influence on the workings of our brains, or if we are just soft machines. He further considers whether a mind can affect matter without violating the principles of physics themselves. And while the majority of scientists and philosophers (for example: Daniel Dennett, Donald Davidson, John Rogers Searle, Paul and Patricia Churchland) today would opt for a mechanistic view of the

[190] Tegmark, M., 'The importance of quantum decoherence in brain processes', *Physical Review E*, 61 (2000), p. 12. <http://arxiv.org/abs/quant-ph/9907009v2> [accessed 27 June 2012].
[191] ibid.
[192] Penrose, R., *Makroświat, Mikroświat i Ludzki Umysł* (Warszawa: Prószyński i S-ka, 1997), p. 159-165.

human brain, David Hodgson makes out a case for the efficacy of the mind by using both philosophy and quantum theory. His philosophical discussions of computers, consciousness, reasoning, evolution, and folk psychology lead on to a penetrating examination of quantum physics and its relevance to the mind. The author draws on quantum indeterminacy and non-locality to outline a theory of the relationship between mind and brain, which accommodates human freedom within a scientific framework.

'The initial interest in quantum mechanics as being relevant to the mind-matter problem concerned its indeterministic character, and the possible "room" it could leave for freedom of the will'[193] claims Hodgson. This indeterministic character together with non-locality and non-materiality of the matter, Hodgson lists as aspects of quantum physics that have an impact on contemporary philosophical thought. He underlines that fact that it is impossible to predict events occurring in the micro world of particles, but is possible to only determine the probabilities of the occurrence of these events; is not a matter of deficiency of knowledge. According to Hodgson, it is just the manner in which the world functions. He adds that this does not cause 'general unpredictability on the macro scale of the objects of our everyday experience because their behaviour depends principally on the statistics of huge numbers of micro events, in relation to which there is practical certainty'.[194] However, with the example of the Schrödinger's cat experiment, Hodgson admits that 'indeterminacy of prediction on the micro scale can produce similar indeterminacy on the macro scale'.[195]

Hodgson states that his main hypothesis is that mental and physical events are aspects of manifestations of the same events of the brain-mind and that there are some discoverable correlations between them. He opts for the substance dualism. While substance dualism is often considered to imply the whole Cartesian tradition, some of the substance dualists, for example E. J. Lowe, Professor of Philosophy and Chair of the Examination Board of the Department of Philosophy at Durham University, emphasises that they are two distinguish theories.[196] Lowe claims that a human being consists of two different substances: the body and the person. He says that they are not identical – 'for they have different persistence

[193] Hodgson, D., *The Mind Matters* (Oxford: Clarendon Press, 1991), p. 381.
[194] ibid., p. 33
[195] ibid., p. 91
[196] Heil, J., *Philosophy of Mind. A Guide and Anthology* (Oxford: Oxford University Press, 2004), p. 852-853.

conditions, just as do their bodies and the masses of matter constituting those bodies at different times'.[197] Nevertheless, the problem of the interaction between these two substances is mutual to both kinds of dualism.

Considering the mental and physical events of the brain-mind, Hodgson claims that macro-physical events of neural firings are aspects of micro events in the quantum world, indicating that mental events are more closely related to quantum events than to the neural firings themselves. Secondly,

> even the best objective description of the events as physical events (that is, in their objective character), comprehending all the insight of quantum theory, cannot account for all the properties of mental events, in particular all their causal properties. And the best description of the events as mental events (that is, in their subjective character) must use the language and concepts of folk psychology, which can, of course, be improved and refined.[198]

Hodgson claims that,

> 'mind and brain are both manifestations of the same underlying reality. Mind can to some extent be said to be a function of the brain, but only if the brain here is understood not as the detectable macroscopic object, but as the quantum reality underlying both this object and the mental events of consciousness'.[199]

According to this view, there is a single reality with its two manifestations: mind and brain. What is more, the world can be considered as a cosmic code, as long as it is not interpreted by the mind. Quantum physics 'shows that the things that are detectable by us, and interpreted by us as the objects and events of our perception, are not the fine details of this code, but rather its gross statistical properties'.[200] This is the objective solution to the so called measurement problem in quantum mechanics - the nature of a particle allows the observer to know its momentum or position, but never these two quantities at the same time. This means that the observer has to decide which of these two to measure. It consists of indeterminism and the non-materiality of matter. According to indeterminism, all physical measurements, Newtonian laws or physical phenomena cannot bring permanent views of the world and cannot predict events; they can give only

[197] ibid.
[198] Hodgson, D., *The Mind Matters* (Oxford: Clarendon Press, 1991), p. 381.
[199] ibid.
[200] ibid., p. 382.

probabilities for individual events. Next, the function of the non-material views of matter, is not to deny the existence of macro objects and macro events of people's experience, but rather to suggest that, 'in certain respect their fundamental nature is not as we assume it to be'.[201]

Hodgson elaborates the conjecture underlining that the 'important difference between this conjecture and the consensus position lies in the denial that any identity between brain and mind can be adequately considered at the level of neurons and neural firings'.[202] He suggests that mental events and neural firings are just functions of the development of the states of the brain and the mind is not only a function of neurons and neural firings. In addition, the author considers non-locality and applies non-local quantum effects to explain how information constantly flows in the brain. It is obvious that Hodgson is under the influence of the works by Roger Penrose, who argues that quantum theory can be effectively applied to explain consciousness. While Hodgson claims that, 'mental events somehow span space, so as to enable simultaneous experiencing of, and acting upon, matters associated with spatially separated physical events', Penrose (together with Hameroff) argues that fundamental entities (for example qualia) 'if they are fundamental, must exist at the fundamental level of the universe, the lowest level of reality that exists. In modern physics that is best described at the Planck scale, the level at which space-time geometry is no longer smooth but quantized'.[203, 204] Their theory is based on quantum effects that appear in tubules that surround the nerve fibres. These tubules are long cylindrical tubes made of microtubules. A tubule is bipolar and as a protein occurs in two three-dimensional structures, thus in at least two different states. A tubule in two forms is the superposition of two states. Thus, inside the tubules, both classical and quantum calculation processes should occur. According to Penrose and Hameroff, consciousness is quantum coherence in the microtubules. Hameroff explains that there is,

> quantum computation in the microtubules inside neurons that reaches the threshold for collapse 40 times a second, to coincide with the 40 Hz gamma oscillations that exist in the brain. And the outcome of each reduction is a

[201] ibid., p. 375.
[202] ibid., p. 382.
[203] ibid., p. 385.
[204] Blackmore, S., *Conversations on Consciousness* (Oxford: Oxford University Press, 2005), p. 118.

> process of quantum superposition, quantum computation, which follows the Schrödinger equation, which is basically deterministic. However, at the instant of collapse there is another influence that enters. This is Penrose's non-computable influence which is due to the fine grain in space-time geometry. This has a little influence on the choices, so that choices result from both the deterministic quantum computation and this non-computable influence.[205]

Hodgson applies the quantum indeterminism and quantum probabilities concerning conscious choices. For Hodgson a person (or a brain-mind) is a physical-mental object and its behaviour depends to some extent on mental events (for example: choices that are based on desires or beliefs) and to some extent on physical events (that are for example: objective brain processes of neural firings). While the objective science suggests that the measurable physical properties and physical events might completely determine the behaviour of this object, quantum theory shows the limits of that assumption. According to the author, because of the quantum indeterminism, 'it becomes clear that the physical properties and laws are not sufficient to determine completely the behaviour of the brain-mind'.[206] While considering cognitive psychology and choice together with its relationship to quantum probabilities, Hodgson often contradicts himself. In the beginning he says:

> I suggest that the physical account could not, even in principle, predict or explain which choice is made: it would at most show the alternatives and their respective probabilities. So the brain-mind can be considered (consistently with the approach of cognitive psychology) as a mechanistic (though indeterministic) computer; but only in so far as it throws up alternatives for choice.[207]

However, he then underlines that 'the choice itself, from a physical viewpoint, would appear as a random reduction of these probabilities'[208] and later 'the general point is that computational procedures plus quantum physics would seem appropriate to give rise to probability-weighted alternatives. The number of alternatives could be finite, if the possibilities are discrete; or infinite, if they are in a continuous spectrum. Each choice would appear as a random state reduction'.[209] Moreover, there is a metaphysical or theological contradiction. Hodgson claims that,

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[205] ibid., p. 120-121.
[206] Hodgson, D., *The Mind Matters* (Oxford: Clarendon Press, 1991), p. 389.
[207] ibid., p. 389-390.
[208] ibid., p. 390.
[209] ibid.

> the choice does not in fact occur at random in accordance with some quantum probability: the apparent random occurrence of one alternative is simply the manifestation of the choice to the physical viewpoint. There is a striking statement in Wilber (1983) that 'the Heisenberg uncertainty principle represents all that is left of God's radical freedom on the physical plane' (p. 169); and that is substantially what I am saying about quantum inderterminism and human choice.[210]

David Hodgson returns to the issue of the conscious choice in his essay *A Plain Person's Free Will*, in which he presents his account of free will in a 'plain person' – a person that is neither a philosopher or a cognitive scientist. From his nine propositions, two are important for the two-stage model for free will and also support his hypothesis from *The Mind Matters*. In the first one, the author says that the minimum requirement for indeterministic free will is 'the alternatives requirement: there is a pre-choice state such that the way the world is and the laws of nature leave open at least two post choice states'.[211] In the fifth proposition, he underlines the selection requirement that is necessary for disproving the alleged division of determinism and randomness. It states that 'the subject makes an effective non-random selection between the available alternatives, based on these non-conclusive reasons, albeit not determined by rules or laws of nature'.[212] At the end of that essay, the author identifies his view on objective science to these from the introduction of the chapter 'Outline of a Theory of Mind' in *The Mind Matters*. According to Hodgson,

> reductionist science has had enormous success in accounting for many aspects of the universe, but very little success in explaining consciousness and its role in the way events unfold in the world. I think it is reasonable to believe that consciousness does have an important and irreducible causal role, and I suggest that something like this version of free will is required to account for this role.[213]

Henry P. Stapp calls for 'societal ramifications of the new scientific conception of human beings'.[214] Nineteenth-century science reduced people to some sort of mechanical automata, where all the physical functions are governed by processes

[210] ibid., p. 392.
[211] Hodgson, D., 'A Plain Person's Free Will', *Journal of Consciousness Studies*, 12 (2005), 1-19, <http://ist.glos.ac.uk/referencing/mhra/page08d.html> [accessed 30 May 2011].

[212] ibid.
[213] ibid.
[214] Stapp, H. P., *Mind, Matter and Quantum Mechanics* (New York: Springer, 2009), p. 237-244.

occurring at atomic or subatomic levels. Since classical physics could not accommodate the existence of such ideas as thoughts or qualia, it questioned their existence or reduced them to, at most, passive bystanders. What is more important, within the classical framework they could not be the cause of any physical event. However, quantum theory has changed the manner in which the physical world is understood. The subatomic level of the matter that is supposed to form the physical world was exchanged for a spread-out nonmaterial structure forming a new kind of physical reality. The reality that includes nonlocalized bits of information that are collected in objective carriers connected to empirical realities. Thus, the twenty-first-century 'elevates human beings to agents whose "free choices" can, according to the known laws, actually influence their behaviour'.[215] According to Stapp, Hodgson's *The Mind Matters* 'documents the pervasive and pernicious effect that the idea that "mind does not matter" is having upon our legal system'.[216]

Hodgson suggests that each person should be considered as comprising of a number of co-operating conscious subsystems. He supports his suggestion by using the examples of split-brain cases and certain performances of the subconscious. He says that 'the possibility that there is not just one centre of consciousness in human beings, but rather a collection of subsystems each of which may be conscious, and more or less integrated into a single system'.[217] Nevertheless, he points out that this collection of conscious subsystems does not exclude the unity of mind. Hodgson states that it seems clear that there is in every normal human being a substantially integrated consciousness, which is engaged for the most important experiences and actions of that person. According to the author, the strong argument for the unity of the mind is the fact that a person at any one time does only one main thing (where the main thing is an act called intentional by that person). The full integrated self-conscious mind does not have to participate in the process of making decisions by the conscious subsystems. Furthermore, 'an essential characteristic of consciousness is the possibility of making decisions between superposed alternatives on the basis of some kind of holistic comparison'.[218] Although Hodgson's idea of the co-operating conscious subsystems might be appealing, the author gives very few details about the

[215] ibid., p. 241.
[216] ibid., p. 242.
[217] Hodgson, D., *The Mind Matters* (Oxford: Clarendon Press, 1991), p. 396.
[218] ibid., p. 397.

manner in which it could work. As he admits, there are only the possibilities for the existence of conscious subsystems instead of just one centre of consciousness in human beings. He is just suggesting and considering these possibilities carefully. Hodgson believes that his approach can be tested in the future. For him, there is not,

> a hard-and-fast line between science and philosophy, but it is rather a matter of degree: the less one relies in uncertain inference, and the more one relies on experiment, the more scientific (and the more dependable) become one's conclusions.[219]

Scientific development may result in extending the possibilities of carrying on the more advanced experiments in different areas. Hodgson hopes that some of the aspects of approaches to the mind-body problem he has suggested will be able to be tested in proper experiments.

While in the mind-body problem Hodgson opts for the dualistic option, he supports his point using the claims and works of Roger Penrose – supporter of the non-algorithmic mathematical materialism and the theory that consciousness is neurophysiologically realised as gravitation-induced reduction of coherent superposition states in microtubules. It also should be mentioned that, despite the fact that the author is generally against the mechanistic views of human brain, he admits that our brains-minds could be 'machines', but they would operate non-algorithmically. He states that 'human reason cannot be formalized; therefore it cannot be mechanized; therefore the brain-mind is not mechanistic'.[220] To support this thesis, Hodgson argues that the brain-mind possesses some information that is not achievable for a non-conscious computer – such as the sense of perception (what-it-is-likeness) or qualia. However, he allows for a possibility that scientific progress will prove him wrong and says that until then 'the choice between the mechanistic consensus approach and the position which I suggest will, for a long time, depend on uncertain plausible considerations'.[221]

[219] ibid., p. 401.
[220] ibid., p. 114.
[221] ibid., p. 402.

## 3.4. Monistic Idealism.

Amit Goswami, theoretical nuclear physicist and member of The University of Oregon Institute for Theoretical Physics, applies quantum theory of consciousness to the mind-body problem in monistic idealism. He gave a new name to traditional idealism in order to underline its connection with mainstream eastern philosophy and mysticism. He says 'the idea that consciousness is the ground of being is the basis of all spiritual traditions'.[222] Goswami's views on quantum theory and monistic idealism

> combines aspects of present-day quantum physics, including the concept of 'collapsing the wave function', with a philosophical idealist or mental monist view that the universe is fundamentally comprised of a living consciousness field (or Being) from which what we take to be physical reality is really an emergent epiphenomenon.[223]

First of all, the difference between realism and idealism needs to be explained. As it mentioned in section 7.1., Michael Lockwood, when considering quantum mechanics and the conscious observer, approaches the Schrödinger's cat problem with a cat placed in its very own live-dead limbo. Lockwood underlines the role of the mind of the observer in that experiment, which also remains in two matching cat situation states. He points out that the experiment fails to satisfy the common-sense intuition, where the cat must be dead or alive regardless of the actions of the observer and concludes that

> state vector reduction is essentially an illusion engendered by our always viewing the world from the standpoints of a particular eigenstate, within our local brain subsystem, of some set of compatible brain observables.[224]

Lockwood explains very roughly that 'realism is the view that reality transcends experience, that propositions can be true or false, independently of our being in a position to tell which they are'.[225] There can be direct (or naïve) realism where the sensory perception makes present to us the particular physical objects and these objects are

[222] Hamilton, C., 'Scientific Proof of the Existence of God. An interview with Amit Goswami', *What is Enlightment?*, 11 (1997) <http://www.enlightennext.org/magazine/j11/goswami.asp> [accessed 15 December 2012].
[223] Klimo, J., *Quantum Idealism: An Idealist Consciousness Model for Collapsing the Quantum Wave Function* (Laughlin: 2006) < www.jonklimo.com/Papers/2006Draft_USPApaper.pdf> [accessed 14 December 2012]

[224] Lockwood, M., *Mind, Brain and the Quantum* (Oxford: Blackwell, 1991), p. 218.
[225] ibid., p. 219.

indeed identical with what they are perceived. This means, among other things, that physical objects are really sweet or bitter, red or yellow. In indirect realism an observation has for its subject the physical object, but only indirectly because the direct subject of a perception is a sensory data that represents a physical object. Not all properties directly perceived are qualitatively identical to properties that perceived physical objects possess. It means that physical objects are not actually sweet and red but have some properties which are perceived as flavours or colours.

When considering quantum physics, scientific realism needs to be mentioned as well. The question of the limits of knowledge in contemporary philosophy of science takes the form of a dispute between scientific realism and various forms of antirealism. In accordance with the view that is scientific realism, the scientific terms have objective reference, whereas scientific statements are generally at least approximately true. The notion of the truth has to be understood epistemologically (at least partially) for compliance of the statements with reality. Thus, in the light of scientific realism, scientific theories provide us with the true (at least approximately) names and characteristics of subjects which exist objectively. It should be noted, that this applies to both objects directly observable, as well as those which are not directly observable. The strongest argument in favour of scientific realism is the so-called argument from the success of science. Its essence is as follows: scientific theories allow us to anticipate events, to act effectively, as well as to design and to construct the devices that operate as expected. The best explanation for these facts is that scientific theories provide us with the true (at least approximately) descriptions and characteristics of the subject (meaning: objects, events, actions, states and processes or even regularities) which actually exist. Using the words of Hilary Putnam, 'realism is the only philosophy that does not make the success of science a miracle'.[226] Putnam emphasises that 'science succeeds in making many true predictions, devising better ways of controlling nature, and so forth, is an undoubted empirical fact. If realism is an explanation to this fact, realism must itself be an overarching scientific hypothesis'.[227] However, modern physics with quantum theory can be a challenge to this view, since the coincidence and probability becomes essential with describing events that take place on the quantum level of matter.[228] This is why, Lookwood suggests that a possible philosophical response to quantum mechanics problems and the limitations of our physical knowledge is the abandonment of realism. John Foster, a British philosopher and author of *The Case for Idealism* and *A World for Us: The Case for Phenomenalistic Idealism*, goes further by saying that

[226] Leplin, J., (Ed.), *Scientific Realism* (Berkeley: University of California Press, 1984), p. 1.
[227] ibid., p. 141.
[228] Clark, S., 'Differently Equal', *New Scientist*, 2900 (2013), 32-36 (p.32-36).

> one interesting and surprising consequence of this limitation on the scope of our physical knowledge is that we can envisage the possibility of the physical world's being, in substance and character, purely mental. For, being ignorant of its content, we are free to suppose that the relevant structure and organization are realized in a domain of minds and mental events.[229]

The term 'idealism' can be understood in many ways and even philosophers can use it in a wide range of meanings. For this discussion three kinds of idealism listed by Foster are meaningful. Foster is concerned mainly by the kind of idealism that can be expressed by the following claims: '(1) Ultimate contingent reality is wholly mental. (2) Ultimate contingent reality is wholly non-physical. (3) The physical world is the logical product of facts about human sense-experience'.[230]

Two doctrines, directly opposing scientific realism, are phenomenalism and conventionalism. According to phenomenalism, the objects of external recognition cannot be the subjects of our knowledge, but only our mental impressions and experiences. It is contrary to the claim of realism that the scientific terms have objective references, whereas conventionalism denies that the scientific claims are true. The methodological assumptions are accepted on the basis of academic agreement or the system which is known that does not stay in authentic relation to reality.

Axioms and laws of empirical science are conventions adopted because of the demand for simplicity, convenience or economy of thinking.[231] One of the older anti-realistic positions is instrumentalism. Its basic idea is as follows: scientific terms are divided into observational (those which are solid, natural interpretation in the domain of macroscopic physical phenomena) and theoretical (those which cannot be observed). As a result of assessing the claims with observational terms, their truth or falsehood can be received. In turn, the claims with only theoretical terms are not subject to such an assessment, but they are merely tools by which predictions are led and known empirical facts are organised. Thus, the theoretical objects exist hypothetically in realism, while according to instrumentalism they are just convenient fictions. In realism scientific theories are guesses about the truth while in instrumentalism they are tools of making predictions about

[229] Heil, J., *Philosophy of Mind. A Guide and Anthology* (Oxford: Oxford University Press, 2004), p. 823.
[230] Foster, J., *The Case for Idealism* (London: Routledge & Kegan Paul, 1982), p. 3.
[231] Zahar, E., *Poincare's Philosophy. From Conventionalism to Phenomenology* (Illinois: Carus Publishing Company, 2001), p. 7-36.

phenomena. The search for the truth is the main aim of science in realism, whereas in instrumentalism, it is making predictions about phenomena, the domination over the nature and technological progress.

A very specific position in the considered dispute is an internal realism proposed by Hilary Putnam. The principle thesis of an internal realism states as follows: the truth depends on the conceptual system, but the conceptual system itself does not prejudge what is true within it. The internal realist question: 'how many objects are there in fact, regardless of any conceptual system?' does not make any sense. According to internal realism, there is no absolute conceptual system. Putnam underlines that

> even a large and complex system of representations, both verbal and visual, still does not have an intrinsic, built-in, magical connection with what it represents – a connection independent of how it was caused and what the dispositions of the speaker or thinker are. And this is true whether the system of representations […] is physically realized – the words are written or spoken, and the pictures are physical pictures – or only realized in the mind. Thought words and mental pictures do not intrinsically represent what they are about.[232]

All these forms of antirealism can be treated as being opposed to scientific realism. However, it is worth noting that the term 'antirealism' is often understood as a 'semantic antirealism'. Semantic antirealism is a theory developed by contemporary British philosopher Michael Dummett. According to this theory, the meaning of sentences has to be characterised in terms of recognisable conditions of a verifiable account. In turn, in the light of semantic realism, the meaning of declarative sentences comes down to what makes these sentences true or to the truthness of their conditions. In one of his early works, Dummett draws from Wittgenstein's *Remarks on the Foundations of Mathematics* arguing that there is no one independent mathematical reality waiting to be discovered. Dummett claims that 'we are free in mathematics at every point; no step we take has been forced on us by a necessity external to us, but has been freely chose'.[233] For Lookwood, Dummett's account of mathematics that opposes realism 'would seem to fit quantum mechanics like a glove'.[234] He recalls the Schrödinger's cat problem pointing out that the cat in the final moment of the experiment is in an indefinite state. At that point, it is not possible to say whether the cat is alive or dead – 'reality itself contains a lacuna at that

[232] Putnam, H., *Reason, Truth and History* (Cambridge: Cambridge University Press, 1981), p. 5.
[233] Dummett, M., *Truth and Other Enigmas* (Harvard: Harvard University Press, 1981), p. 18.
[234] Lockwood, M., *Mind, Brain and the Quantum* (Oxford: Blackwell, 1991), p. 219.

point, one which will only be filled when we open up the chamber and look inside'.[235] The moment of opening the box and looking inside is this point in time when one of the statements describing the cat's state becomes true. In other words:

> if we think that mathematical results are in some sense imposed on us from without, we could have instead the pictures of a mathematical reality not already in existence, but as it were coming into being as we probe. Our investigations bring into existence what was not there before, but what they bring into existence is not of our own making.[236]

This way of reasoning is very similar to Goswami's views on consciousness and quantum mechanics. However, he goes far beyond mathematical truths and thought experiments such as Schrödinger's cat by claiming that the whole universe, i.e. everything that exists, came into being as a result of conscious observation of the individual.[237] Goswami states that 'quantum superpositions of possibilities (packets of possibility waves related by phase) occur within consciousness. When consciousness recognizes a particular possibility, it chooses it; the recognised possibility becomes actuality'.[238]

Goswami uses quantum theory to explain how the illusory separation between matter and mental arises and to determine its nature. According to quantum theory, a quantum object appears in particular place if it is measured (the measurement problem), it is in superposition of states until it is observed (collapse of the wave) and can be in more than one place at the same time (the wave property). Furthermore, Alain Aspect's experiment verified that objects have connections outside of space and time. The results of this experiment are very important for Goswami's premise, which claims that we should change our worldview. In 1982 Alain Aspect, the French physicist, developed the Clauser-Freedman experiment. Originally in the experiment, two photons were moving to the two different places A and B. These photons, going in opposite directions, could not communicate with each other using the light signal because they were moving at the speed of light. However, measuring instruments in places A and B were set up before the experiment, thus enabling the photons to communicate with each other in an ordinary way (using the light signals in the space and time). Alain Aspect introduced an important

[235] ibid., p. 220.
[236] Dummett, M., *Truth and Other Enigmas* (Harvard: Harvard University Press, 1981), p. 18.
[237] Hamilton, C., 'Scientific Proof of the Existence of God. An interview with Amit Goswami', *What is Enlightment?*, 11 (1997) <http://www.enlightennext.org/magazine/j11/goswami.asp> [accessed 15 December 2012].
[238] Goswami, A., *The Visionary Window.A Quantum Physicist's Guide to Enlightenment* (Wheaton: The Theosophical Publishing House, 2000), p. 47.

change to this experiment – the settings of the measuring instruments could be changed in the very last microsecond before taking the measurement. This means that the information of the instruments' settings does not have enough time to move from place A to place B, even at the speed of light. Moreover, these photons continue to affect one another's behaviour from a distance, without exchanging any signal through space.[239] Henry Stapp wrote 'the philosophical position of Bohr seems to lead to the rejection of the other possibilities, and hence by inference, to the conclusion that superluminal transfer is neseccary'.[240] For Goswami, this experiment verifies the notion of transcendence and the influence that these two photons have on each other 'must belong to a domain of reality that we must recognise as the transcendent domain of reality'.[241] He also underlines that although the results verify the events occurring on the subatomic level and seem more apparent for submicroscopic objects (such as electrons or photons), all matter and all reality is governed by the same laws.

Goswami claims that 'we are always dealing with quantum objects because it turns out that quantum physics is the physics of every object. Whether it is submicroscopic or it is macroscopic, quantum physics is the only physics we have got'.[242] He underlines that is also the reason for the paradigm shift – from what is called 'upward causation' to 'downward causation'. Goswami characterises the current paradigm as a materialistic view of the world where all the cause comes from the elementary particles. It can be described as a chain: quarks build up the elementary particles, the elementary particles build up the basic element of the matter – atoms. Further, atoms make up molecules, molecules build up cells and finally the brain is made up of cells. All the interactions and phenomena that take place on the subatomic level between the elementary particles are the ultimate cause. Goswami states that according to this view, free will is just an illusion – 'it is only an epiphenomenon or secondary phenomenon, secondary to the causal power of matter'.[243] That is why Goswami speaks about the need for a new paradigm, to which he refers as a 'monistic idealism'. He emphasises that his view does not deny the upward causation. Thus, matter still has causal potency. However, consciousness is the ground for all the being and it manifests itself through downward causation, which shows up in acts of free will, taking decisions, being creative or making moral choices.[244] Goswami uses quantum physics as a ground for his paradigm, focusing mainly on the role of the

[239] Zukav, G., *The Dancing Wu Li Masters. An Overview of the New Physics*(London: Rider, 1979), p. 303-311.
[240] ibid., p. 310.
[241] Hamilton, C., 'Scientific Proof of the Existence of God. An interview with Amit Goswami', *What is Enlightment?*, 11 (1997) <http://www.enlightennext.org/magazine/j11/goswami.asp> [accessed 15 December 2012].
[242] ibid.
[243] ibid.
[244] ibid.

observer during taking any measurement or making any observation, and the collapse of the wave. He explains that

> because it is our observation of a quantum object that collapses the quantum wave of many possible facets into a unique event of actuality in our experience, we must say that it is our consciousness that chooses. So in quantum physics, the agent of downward causation is recognized as the consciousness of a human being.[245]

According to Goswami, consciousness is primary and makes up the ground of all being. It consist of three realms – the world of matter and the world of mental phenomena (two immanent realms) and the transcendental realm. He underlines that there is nothing outside of consciousness and all three realms exist within and as consciousness. The two immanent realms exist as the phenomenal manifestation of the transcendental realm: that is their source. This nonlocal consciousness self-referentially collapses the wave function and this explains all quantum mechanics problems.[246] In order to avoid raising any logical paradoxes, Goswami says that 'this choosing consciousness is unitive and nonlocal – that is, it communicates its choice without using signals – and is the same for all of us. In other words, the choosing of consciousness is objective'.[247]

Furthermore, he believes that this objective consciousness should be actually seen as the creator of the world. Goswami points out that while according to the Newtonian physics objects are perceived as definite things, in quantum physics they are just possibility waves. These possibilities can convert into actuality. He argues that

> the material world of quantum physics is just possibility. It is consciousness, through the conversion of possibility into actuality, that creates what we see manifest. In other words, consciousness creates the manifest world.[248]

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[245] Goswami, A., *Creative Evolution: A Physicist's Resolution Between Darwinism and Intelligent Design* (Wheaton: The Theosophical Publishing House, 2008), p. 31.
[246] Goswami, A., *Quantum Physics and Consciousness* <http://www.youtube.com/watch?v=s42mrdhKwRA> [accessed 15 December 2012].

[247] Goswami, A., *Creative Evolution: A Physicist's Resolution Between Darwinism and Intelligent Design* (Wheaton: The Theosophical Publishing House, 2008), p. 32.
[248] Hamilton, C., 'Scientific Proof of the Existence of God. An interview with Amit Goswami', *What is Enlightment?*, 11 (1997) <http://www.enlightennext.org/magazine/j11/goswami.asp> [accessed 15 December 2012].

However, the collapse of quantum wave function as a result of which possibilities become actual events, can only happen in the presence of brain-mind awareness. There is need for an embodied sentient being, a human observer, a conscious biological being. Thus, this consciousness that is not material, but transcendent, has one more important characteristic. Goswami calls this 'self-reference' and describes it as follows: 'in the event of a quantum collapse, consciousness becomes "self-referent" in us, not only giving us the sensations of the manifest object but also the experience of a self- a subject that senses the object as separate from itself'.[249]

Self-reference is one of the most important notions in Goswami's views on consciousness. However, it is not possible to explain this key element logically and completely. Even Goswami writes in his book *The Visionary Window: A Quantum Physicist's Guide to Enlightenment*:

> But there is a paradox here. Awareness is necessary for collapse, we are saying, but awareness implies a subject-object split. How can such a split – itself a manifestation of awareness – arises without a prior collapse?[250]

The author has tried to find the answer by introducing the 'dependent co-arising'. He claims that at the moment of collapse, the subject (i.e. the reason of collapse) and object (i.e. is the object of awareness, the observer) are dependently co-arising. At the same point, Goswami underlines that it is not the case of dualism, since the split between object and subject is merely illusory. For him, consciousness is 'mistaking itself to be separate from the objects of experience. This mistaken identity is responsible for the subject-object world of our experience. Experience itself could not exist without this "mistake"'.[251] Firstly, calling the subject-object split a mistake seems to not adequately explain the whole phenomenon. What is more, it is hard to determine if subject and object could be one and the same thing since Goswami does not say precisely what the notion of subject really is. Secondly, this illusory division between subject and object does not follow logically the measurement's being self-referential.[252] This is a category error to say that nonlocal consciousness is derived from self-reference. In Goswami's philosophy, self-reference is 'a property of propositions. It is not a property of any physical things, or indeed of any

[249] Goswami, A., *Creative Evolution: A Physicist's Resolution Between Darwinism and Intelligent Design* (Wheaton: The Theosophical Publishing House, 2008), p. 32.
[250] Goswami, A., *The Visionary Window.A Quantum Physicist's Guide to Enlightenment* (Wheaton: The Theosophical Publishing House, 2000), p. 48-49.
[251] ibid., p. 49.
[252] Lloyd, P. B., *Discussion of Amit Goswami's Science Within Consciousness* (1999) < http://www.peterblloyd.org/essays/goswami.htm> [accessed 15 December 2012].

mental things. So, it cannot be correct to say that a measurement "produces self-reference"'.[253]

What is also worth being underlined is that according to Goswami's monistic idealism, mind and matter are the immanent realms existing through the transcendent realm of consciousness. To illustrate this with *Schrödinger's cat experiment: the cat is in the state of superposition. The act of observation can collapse this superposition to the cat being alive and the cat being dead. While in the Copenhagen interpretation of this experiment,* the superposition is in physical space-time, according to Goswami's interpretation superposition of the cat's state belongs to the transcendent realm. Both cases are governed by the same rules of quantum mechanics. However, in Goswami's version, it is impossible to use the concepts of space or time. Thus, it is impossible to apply the concepts of quantum mechanics and the collapsing wave function because they are conceived within the context of time and space. This means that idea of nonlocal consciousness that collapses the wave function is meaningless.

It is important, that a rational approach is not incompatible with spiritual exploration, mysticism and all human spiritual culture. However, the New Age phenomenon, once fueled by authors such as Fritjof Capra and Gary Zukav whose' work was casually interpreted by the followers of the New Age Movement, became the cause of a number of absurdities.[254, 255] These, in the scientific tone, try to undermine the existing paradigm without giving anything in return but pseudo-scientific gibberish. As Victor Stenger, emeritus professor of physics and astronomy at the University of Hawaii and Visiting Fellow in Philosophy at the University of Colorado characterises:

> Certain interpretations of quantum mechanics, the revolutionary theory developed early in the century to account for the anomalous behavior of light and atoms, are being misconstrued so as to imply that only thoughts are real and that the physical universe is the product of a cosmic mind to which the human mind is linked throughout space and time. This interpretation has provided an ostensibly scientific basis for various mind-over-matter claims, from ESP to alternative medicine. 'Quantum mysticism' also forms part of the intellectual backdrop for the postmodern assertion that science has no claim on objective reality.[256]

[253] ibid.
[254] Capra, F., *Tao Fizyki* (Poznań: Rebis, 2001)
[255] Zukav, G., *The Dancing Wu Li Masters. An Overview of the New Physics*(London: Rider, 1979)
[256] Stenger, V., 'Quantum Quackery', *Skeptical Inquirer*, 21.1 (1997)
< http://www.csicop.org/si/show/quantum_quackery> [accessed 15 December 2012].

One of the examples of such a pseudo-science is the movie *What the Bleep Do We Know?*, which combines randomly chosen fragments from quantum theory, philosophy, brain science and eastern mysticism.[257] According to Skeptic Magazine, this movie is 'a fantasy docudrama cult hit that has found national distribution and is playing to full houses across the country'.[258] Amit Goswami is one of the scientists who agreed to take part in this movie, and along with other things states 'the material world around us is nothing but possible movements of consciousness. I am choosing moment by moment my experience. Heisenberg said atoms are not things, only tendencies'.[259] It has to be underlined that a quote like this, taken out of the context and put between other random quotes, can be easily misunderstood. Unlike Goswami, David Albert, a professor at the Columbia University physics department, who also appeared in *What the Bleep Do We Know?* accused the producers of manipulating what he said to actually fit the spiritual message of the movie. Albert says that

> it is certainly the case that I was edited in such a way as to completely suppress my actual views about the matters the movie discusses. I am, indeed, profoundly unsympathetic to attempts at linking quantum mechanics with consciousness. Moreover, I explained all that, at great length, on camera, to the producers of the film… Had I known that I would have been so radically misrepresented in the movie, I would certainly not have agreed to be filmed.[260]

This particular movie is a very good example of how quantum theory (or, in fact, any scientific theory) can be misinterpreted and presented in a harmful way. What is more, it can be very misleading and misinforming that in the New Age materials, professors and widely understood academics with their views are put in the same line as self-styled prophets or experts in non-scientific fields. *What the Bleep Do We Know?*

> begins as promises of freedom of thought soon evolves into demands for correct thought and behavior. […] The source of the correct ideas is the prophet. The promised payoff for adherence to the dogma is freedom from the fears of death,

[257] *What the Bleep Do We Know!?*, dir. by William Arntz, Betsy Chasse, Mark Vincente (Roadside Attractions. 2004)

[258] Olmsted, J., 'Ramtha's School of Quantum Flapdoodle', *Skeptic*, (2004) < http://www.skeptic.com/eskeptic/04-10-01/> [accessed 15 December 2012].

[259] *What the Bleep Do We Know!?*, dir. by William Arntz, Betsy Chasse, Mark Vincente (Roadside Attractions. 2004)

[260] Gorenfeld, J., 'Bleep of Faith', *Salon* (2004) < http://www.salon.com/2004/09/16/bleep_2/> [accessed 15 December 2012].

> disease, and misery. The fact that these are deep fears that we are all vulnerable to, sets the stage for rampant exploitation and abuse by charlatans and cults.[261]

Passion for quantum theory is as common in New Age literature as criticism of Newtonian paradigm, which is presented almost like a curse. In Newton's *Philosophiae Naturalis Principia Mathematica*, the beginnings of the laws of motion are discussed. These are among the other three universal laws of motion that were not improved until the time of Albert Einstein. He used the Latin word *gravitas* (weight) for the force that would become known as gravity, and defined the law of universal gravitation. In the same paper he also presented the first analytical determination of the speed of sound in air.[262] Newtonian physics is still valid for systems on a scale of planetary systems, and the theories of quantum mechanics so readily invoked by New Age teachers do not undermine it, but rather complements the theories in relation to the quantum level, just as Einstein's theories of relativity apply to the macro-universe. Stenger claims that

> except for computer chips, lasers, and a few other special devices, most of today's hightech society is fully explicable with classical physics alone. While quantum mechanics is needed to understand basic chemistry, no special quantum effects are evident in biological mechanisms. Thus, most of what is labeled natural science in today's world still rests on a foundation of Newtonian physics that has not changed much, in basic principles and methods, for centuries.[263]

This approach is both rational and empirical. In addition, it complements the quantum theory, which should be considered as a result of the nature of knowledge and not its weakness.

This is related to another issue, namely the axioms. Each study is based on certain axioms. An axiom is a primary requirement, which is not defined. It is itself the basis for the definition of the formulation. Some of the axioms of Euclidean geometry, for example, say that the triangle is a polygon, the sum of the angles is 180 °, and the point is located next to the line; we can perform exactly one other straight line parallel to that. Axioms of first-order logic, for example, the principle of non-contradiction says that the one and the

[261] Olmsted, J., 'Ramtha's School of Quantum Flapdoodle', *Skeptic*, (2004) < http://www.skeptic.com/eskeptic/04-10-01/> [accessed 15 December 2012].
[262] Stanford Encyclopedia of Philosophy, *Isaac Newton* (Stanford: Stanford University, 2007) < http://plato.stanford.edu/entries/newton/#NewWorInf> [accessed 15 December 2012].
[263] Stenger, V., 'Buddy Can You Paradigm?', *Skeptical Inquirer*, 10.3 (2000) <http://www.csicop.org/sb/show/buddy_can_you_paradigm> [accessed 15 December 2012].

same thing cannot be held to be one kind and to be not at the same time. Some scientists argue that the only logical axioms are the first-order predicate calculus reliable and consistent basis for inference, which does not require justification.[264]

Further, Kurt Gödel, an Austrian logician and mathematician, developed the incompleteness theorems and consistency.[265] The first of these laws states that any formal system (which includes the axioms of arithmetic of natural numbers) is either complete or consistent, and never has both these qualities at the same time. In other words, the truth of all sentences of a particular system can be decided, but in the system there is one more true sentence negation of which is also true. Therefore, the system is either internally inconsistent or the system does not have to be contradictory, but then there are sentences whose truth cannot be inferred from the axioms and theorems of a formal system under consideration. The second of Gödel's theorems is the consequence of the previous. It says that it is impossible to prove, under this system, the consistency of any formal system containing arithmetic of natural numbers. To carry out this proof, there is need for a higher-order system, the consistency of which itself cannot be proved either – and so on to infinity.[266] The popular understanding of Gödel's theorems can lead to inaccurate conclusions such as the conviction that it is never known what is true or that any system of reasoning is inconsistent or incomplete. For first-order logic, a system of a higher-order is logic of quantifiers of the second-order based on it - for example - mathematics. For the Newtonian physics, the system of higher-order is the quantum mechanics and Einstein's theory of relativity. They do not deny the Newtonian physics, but complement it within this range, where its axioms in the comparison with reality can lead to conflict or inaccurate results. It is possible that quantum physics one day will also come to a point where there will be a need to complement it with a system of even higher-order. However, it does not imply that Newton was wrong and classical physics has to be completely dismissed.

Another phenomenon that is erroneously interpreted is the Heisenberg uncertainty principle. Considering the wave-particle duality, these two types of properties

[264] Gregory, R. L. (ed.), *The Oxford Companion to the Mind* (Oxford: Oxford University Press, 1987), p. 67.
[265] Stanford Encyclopedia of Philosophy, *Kurt Gödel* (Stanford: Stanford University, 2011) <http://plato.stanford.edu/entries/goedel/> [accessed 15 December 2012].

[266] ibid.

> are said to be incompatible. Measurement of one quantity will in general affect the value the other quantity will have in a future measurement. Furthermore, the value to be obtained in the future measurement is undetermined; that is, it is unpredictable-although the statistical distribution of an ensemble of similar measurements remains predictable. In this way, quantum mechanics obtains its indeterministic quality, usually expressed in terms of the Heisenberg uncertainty principle. In general, the mathematical formalism of quantum mechanics can only predict statistical distributions.[267]

In the quantum world it is not possible to accurately measure both the position and momentum of a particle, as each measurement by its very nature affects the test object by changing its properties. Only average results of a series of multiple measurements can be provided. It is important to emphasize that this uncertainty is not a measurement error resulting from imperfect measurement devices or methods, but an uncertainty arising from the essence of the results of the measurement. The measurement itself changes the state of the system in the vast majority of cases. This principle is related to the physical size called Planck's constant, which defines a characteristic scale here. The objects for which the wavelength is close to this scale gain some extraordinary properties . One example is the electron which through tunneling can pass through a narrow barrier of potential, despite the fact that its energy is smaller than the height of the barrier. However, physical objects larger than the length determined by the Planck constant do not have such properties.

To conclude, the Newtonian paradigm, the notion of axiom or Heisenberg uncertainty principle have been mentioned in order to draw attention to the fact that inaccuracy or incompleteness of scientific theories are not and should not be the basis on which to draw hasty conclusions or violent claims that the learning curve is over, and it is high time for a new paradigm based on something else. Moreover, they certainly should not be discussed in twenty-second sound bites as was done in *What the Bleep Do We Know?*, which results in 'a blend of riveted attention and confusion that puts the critical mind to sleep, softening up the viewer to ideas that begin with human potential and end with walking on water'.[268]

[267] Stenger, V., 'Quantum Quackery', *Skeptical Inquirer*, 21.1 (1997)
< http://www.csicop.org/si/show/quantum_quackery> [accessed 15 December 2012].
[268] Olmsted, J., 'Ramtha's School of Quantum Flapdoodle', *Skeptic*, (2004)
< http://www.skeptic.com/eskeptic/04-10-01/> [accessed 15 December 2012].

However, the whole realm of human spirituality and faith is an autonomous sphere, the domain of mysticism. Mysticism is associated with the language of communication of authentic spiritual experience. It always presents the question of whether the limits of our language are the limits of our knowledge. For if language is to set the limits, then the next question arises about authenticity, and even the value of mystical experiences, in particular that

> the idea that consciousness creates reality is at the core of most religions. Objective reality is the unfolding of the spiritual world on the plane of physical existence. In the past it was consciousness of god or gods doing their work on earth in a rich variety of religious mythology. In New Age interpretations you are the god of your own individual world.[269]

[269] ibid.

# Conclusion

The human brain is the most complex object in the known universe and the human mind is the most mysterious. ‘Mind’ or ‘consciousness’ is the complex formation of capacity to understand subjective vision of the world through cognitive processes and active exploration. A subjective view of the world includes the physical world, social relations and ideas about ourselves. Exploration includes perception, remembering, thinking and evaluating. It is also an active process, which means action associated with planning acts of decision-making, control of behaviour and attention. A specific property of the consciousness is awareness, the ability to ‘realise’ our own cognitive processes. Although, it is possible to name some of the properties of consciousness or give examples for what tends intuitively to be called consciousness, there is no objective scientific definition that would capture the essence of this phenomenon. The first chapter of this project defines the difficulty of determining what consciousness really is, as well as analysing and critically assessing the mind-body problem.

The dichotomy of mind and body is considered from two traditional standpoints – dualistic and monistic. The arguments in favour of each of them are presented. While dualism naturally distinguishes subjective features of consciousness from the brain activities, a problem occurs in how the interaction is possible between subjective elements and the physical entities present in time and space, and how these subjective elements emerge. On the other hand, the monistic theory does not make any distinction between the subjective mind and brain activity. The point to draw from in answering the first research question (what are the prevailing theories of the mind-body problem in the philosophy of mind?) is underlining the tendency of moving towards a monistic option in the mind-body problem. However, there is an issue for monism to explain how mind and brain can be one (or identical) when they appear to be so different.

Since the second research question of the project critically examines whether quantum mechanics helps to solve the mind-body problem, in chapter two there is a focus on the mutual relation between philosophy and science, and physics in particular. It is underlined, that the mind-body problem and the notion of consciousness in the philosophy of mind show how strictly philosophy is connected to science. Jean Piaget’s concept of the whole of reality is another example of this association. According to this, our scientific knowledge is constantly changing, which simply means not only that philosophy has to be developing, but can also draw on and be inspired by new resources or fresh insight. The second

enquiry of this chapter is to point out the difference in philosophical and scientific understanding of the word 'substance' (crucial to the mind-body problem). Although everyday use of the term seems very different from the meaning it has in philosophy, an enquiry into the difference between these meanings shows that possible inadequacies and inaccuracies in interpreting physical events by philosophers and philosophical issues by physicists can be overcome and mutual understanding is possible. Furthermore, continuous evolution in science and an increasingly stronger connection of philosophy with other disciplines may be a forerunner of a return to the pre-Aristotelian distinction between philosophy as a study of being and physics as an empirical reflection of nature, when the subject of philosophy and physics was identical.

The big challenge for physics is to create a model of the world that can be fully understood. An important part of that world is how to make up our minds. After one thousand years of philosophical debate the nature of mind is becoming clearer thanks to advances in neuroscience, the various branches of science investigating the structure and activity of the neurons in the brain. Moreover, physics is the basis for most of the experimental methods, including methods of imaging brain activities. The relation between mind and body has started to be tackled from a completely new viewpoint since philosophers have started to assimilate the implications of quantum physics (for example: quantum superposition or non-locality). 'The historical motivation for exploring quantum theory in trying to understand consciousness derived from the realization that collapse-type quantum events introduce an element of randomness, which is primary rather than merely due to ignorance or missing information'.[270]

The final chapter of the project interrogates whether there is any merit in adopting quantum mechanics for the study of consciousness and matter. For more than forty years, issues related to the interpretation of the foundations of quantum mechanics, in particular the so-called problem of the observer and the collapse of the wave function, with the issue of consciousness. The quantum world is described by the wave function as the world of potentially existing possibilities that are realised only as the result of a measurement that makes it a specific phenomenon. The question is whether there is a need for an observer, or if a result of irreversible record is enough. There are many alternative theories of measurement in quantum mechanics, which do not refer to consciousness. So far, this line of thought has not brought any results. Although all examples of new approaches to consciousness analysed in this project are both promising and problematic at the same

[270] Stanford Encyclopedia of Philosophy, *Consciousness* (Stanford: Stanford University, 2004) <http://plato.stanford.edu/entries/consciousness/#2> [accessed 25 April 2011].

time, it might still be too soon 'for the physicists and philosophers groping towards such a new picture of consciousness and the universe to have produced a satisfactory outline of its likely shape'.[271] Applying quantum mechanics to the description of the techniques and methods in the study of psychology and consciousness can bring a breakthrough. Quantum effects occur not only in mobile phones and computers, but also in neurons, in which a picture of reality is created. According to many contemporary physicists the problem of consciousness is related to the structure of space-time on the Planck scale. If we accept the quantum theory of consciousness, we need to select a scene in which quantum processes take place. This scene is the brain that in quantum theory is an empty, four-dimensional space-time, which has its own internal structure of an unimaginably small scale (the Planck length). At these distances, space is like 'foam', whose cells have a microscopic volume (an atom spatially consists in almost one hundred percent of the quantum vacuum). According to current knowledge this vacuum ensures the stability of atoms. If consciousness is also fixed in the quantum vacuum, it may affect the properties of matter. Hameroff together with Penrose collaborates on the theory that consciousness depends on quantum coherence in microtubules that are qualified as atomic structure because of their sizes, which means that they are governed by quantum laws. According to their hypothesis, the cytoskeleton of cells is equipped with its own 'nervous system'. Penrose and Hameroff claim that the reversible consciousness loss during the anaesthetic is proof of the connection between the cytoskeleton and the consciousness. However, non-algorithmic mathematical materialism and the theory that consciousness is neurophysiologically realised as gravitation-induced reduction of coherent superposition states in microtubules are criticised as being obscure and the Penrose - Hameroff approach brings some major difficulties with empirical confirmation. The extremely sophisticated way in which the whole process of gravitation-induced reduction occurs in microtubules, developed by Penrose and Hameroff, might be perfectly comprehensible in the foreseeable future. However, today it is rather speculative.

Similarly to Penrose, David Hodgson states that mental and physical events are aspects of manifestations of the same events of the brain-mind and there are some discoverable correlations between them. He claims that macro-physical events of neural firings are aspects of micro events in the quantum world, which means that mental events are more closely related to quantum events than to the neural firings themselves. As he admits, there are only the possibilities for the existence of conscious subsystems instead of only one centre of consciousness in

[271] Gribbin, J., *In Search of Schrödinger's Cat. Quantum Physics and Reality* (London: Black Swan, 1991), p. 230.

human beings. He is just suggesting and considering these possibilities carefully. Hodgson believes that his approach can be tested in the future. Scientific development may result in extending the possibilities of carrying on the more advanced experiments in different areas. Hodgson hopes that some of the aspects of approaches to the mind-body problem he has suggested will be able to be tested in proper experiments.

On the other hand, Amit Goswami applies quantum theory of consciousness to the mind-body problem in monistic idealism. Goswami's views on quantum theory and monistic idealism are the combination of the aspects of quantum physics with the mental monist view that there is a living consciousness being and what we take to be physical reality is really an emergent epiphenomenon. According to Goswami, consciousness is primary and makes up the ground of all being. This nonlocal consciousness self-referentially collapses the wave function and this explains all quantum mechanics problems. While penetrating the prevailing theories, the risk of applying the theories chaining together mysticism and New Age Movement with the quantum theory and philosophy of mind is underlined. It is important that a rational approach is not incompatible with spiritual exploration, mysticism and all human spiritual culture. However, the New Age phenomenon, once fueled by authors such as Fritjof Capra and Gary Zukav whose work was casually interpreted by the followers of the New Age Movement, became the cause of a number of absurdities. Nevertheless, the development of quantum mechanics might bring a clear explanation for Goswami's idea of nonlocal consciousness that causes collapse and verify his philosophy or any other theory that seems lacking serious scientific or philosophical background.

In spite of applying quantum theory to the mind-body problem, there is still no final answer to what consciousness is. It is quite possible that comprehensive definitions of the phenomenon require theories of many types. Nevertheless, Henry Stapp wrote in 1971: 'Human inquiry can continue indefinitely to yield important new truth'.[272] Although theoretical, quantum mechanics has initiated a reexamination of the views of brains and bodies so far. It may explain consciousness and provide the answers to the age-old metaphysics questions about the relationship and parallelisms of body and mind. On the other hand, it may not.

[272] Zukav, G., *The Dancing Wu Li Masters. An Overview of the New Physics*(London: Rider, 1979), p. 329.

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