METHODOLOGICAL PHYSICALISM

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ABSTRACT

METHODOLOGICAL PHYSICALISM

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Contemporary materialism, which tries to explain the working principles of the mind and the universe, become less meaningful after the developments in the modern physics. The modern physics showed that the definition of matter, as it is used in defining materialism, is no longer valid. Chomsky states his position as "Chomsky's challenge to materialism" by claiming that with the abolishment of the definition of the matter, there is no reason to defend materialism, which depends on that definition. Therefore, materialism becomes an empty doctrine thus cannot be used in explaining the mind. The developments in the modern physics creates the need for a new doctrine, which can explain the mind and at the same time be compatible with the modern physics and possible any future physics. This new

doctrine, the methodological physicalism, aims to explain the mind by using the modern physics. Creating such a doctrine requires understanding of materialism and its form as well as understanding the problems of materialism and its forms. By identifying the defects in materialism and by using the modern physics as a standing point methodological physicalism can achieve a more successful understanding of the working of the mind. By using the modern physics, the methodological physicalism can explain why the currents models of the mind fail. Moreover, it can explain how certain models of the mind constructed, which employs the quantum mechanics while explaining the mind. The methodological physicalism will help understanding the mind where materialism fails to do so.

Keywords: Materialism, Physicalism, Quantum Mechanics

ÖZ

METODOLOJİK FİZİKALİZM

Emre Keskin
Yüksek Lissans, Bilişsel Bilimler
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Aklın ve evrenin calışma prensiplerini açıklamaya çalışan çağdaş materyalizm, modern fizikteki gelişmeler yüzünden anlamını yitirmeye başlamıştır. Modern fizik, materyalizmin tanimlanmasında kullanılan materyal tanımının savunulamaz hale geldigini göstermiştir. Chomsky materyal tanımının ortadan kalkması ile materyalizmin savunulacak bir yanı kalmadığını söylemektedir. Buyüzden materyalizm boş bir teori haline gelmiş ve aklın açıklanmasında kullanılamaz bir hal almıştır. Modern fizikteki bu gelişmeler aklın açıklanmasında modern fizik ile uyum içinde olan bır teorinin geliştirilmesi gereğini ortaya çıkarmıştır. Böyle bir yeni teorinin oluşturulması için öncelikle materyalizm ve belli materyalizm çeşitlerinin kavranması gerekmektedir. Böylece materyalizmin icinde bulunan yanlıslar belirlenerek ve modern fizik teorisi bir

baslangıç noktası olarak kullanılarak metodolojik fizikalizm aklı acıklamada klasik teorilerin başarısız oldugu noktalarda daha gerçeğe yakın sonuçlar elde edebilir. Bunun yanında bu yeni teori kuantum fiziğnide kullanarak bazı akıl modellerinin açıklanmasında kullanılabilır. Sonuç olarak metodolojik fizikalizm aklın yapısının anlasılmasında klasik materyalizmin başarısız olduğu noktalarda daha doğru sonuçlar elde edilmesine yardımcı olacaktır.

Anahtar Kelimeler: Materyalizm, Fizikalizm, Kuantum Mekaniği

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TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 Methodological Physicalism[1]

The "human mind" has always been an appealing research project for many cognitive scientists and philosophers. It has always been a very challenging puzzle too. There are many aspects of it, which are still mostly inexplicable by men such as the correlation between the mind and the brain, whether the mind is an extension of the brain or it is something completely separated. Thus, the human mind is still a very significant subject for research. In the modern sciences, there have been many attempts to explain and understand the human mind, such as neuroscientific studies, which focus on the biology of brain; computational models of mind, which focus on functional similarity between the mind and computers; and philosophical approach to the mind, which focus on metaphysical and ontological foundations of the mind. In my dissertation, I will mostly contemplate on philosophical aspects of the mind and the principles of its functioning, specifically the claims of classical materialism

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[1] In "Chomsky's Challenge to Physicalism" (2003), Poland employs the term methodological physicalism as a way of trying to overcome the problems Chomsky raises in his "*New Horizons in the Study of Language and Mind*"(2000). While Poland and I try to construct a more plausible version of materialism/physicalism, the usage of the term in two cases differs. Poland uses the term to refer to a particular methodology of the modern science as the methodology, whereas my understanding is to describe a particular methodological attitude in carrying out a particular activity. This attitude does not commit itself to a particular methodology as the one, but underlies a methodological principle that one should adopt the best available physical theory to deal successfully with some issues arising in a given domain. This is not because it is the best available scientific theory but it is the best one to capture some properties and relations in a given domain.

concerning the mind.

According to classical materialism, understanding of the mind requires an understanding of the universe, where the mind is functioning. This is because the universe is the domain where the mind functions, and physical laws governing the universe also govern the working of mind. The mind is not above or outside the universe, thus obeys its laws in its operation. Thus, the idea is that if we know and understand the laws of nature we can as well know and understand the human mind. As it is said above, I will mostly concentrate on materialism and physicalism since I am interested in seeing whether Chomsky's criticism holds, and if so, what changes one should make in classical materialism in order it to be a viable position.

Since materialism (and thus physicalism) does not make any distinction between the universe and the mind, it provides grounds for working with laws of physics more than any other doctrine to understand the mind. Because of this feature of classical materialism, one might argue that it is a better starting point compared to other doctrines. It is because the success of modern physics creates a reliable research base.

However, classical materialism is criticized by Chomsky[2]. According to Chomsky, classical materialism is only partially correct; for the definitions of "material" and "physical", the very defining features of the doctrine, are not consistent with those of the modern science, that is, classical materialism is still working within the definition of the classical physics, that is, the Newtonian physics.

What Chomsky claims is that since the abolishment of the contact mechanics the definitions of material, with which classical materialism is working, has become irrelevant because there are entities in the universe which still obey the laws of modern physics but which are not anymore physical in the sense that contact mechanics defines. Hence, since the definition of classical materialism depends on the concepts above, it is clear that materialism can no longer be regarded as a viable doctrine in accounting for the mind. Therefore, based on Chomsky's criticisms one

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[2] Chomsky 2000 , p 26.

might argue that if anyone is aiming to save classical materialism, then one would recourse to two alternatives of action. The first one is to make certain modifications within classical materialism in order to buffer off Chomsky's criticism. The second one is to construct a new thesis to explain the universe and the mind in the spirit of materialism.

Before discussing which of the alternatives to follow, one has to establish whether Chomsky's criticism is tenable or not. To establish if this is so, it is required to see whether any one of some forms of classical materialism such as reductive materialism, eliminative materialism, functional materialism, which were constructed without taking into account of Chomsky's criticism, works. Those views were brought about by making modifications within classical materialism not in its hard core but in the set of assumptions laid on its periphery. Chomsky, on the other hand, challenges the very core component of classical materialism, which is the definition of "material" or "physical". Therefore, this situation permits me to use the Duhem thesis as an analytical tool in order to see whether the problem of classical materialism lies in its core or in the set of its assumptions.

If the application of the Duhem thesis shows –of course with a high degree of probability- that the problem does not arise out of the set of the assumptions, then one can safely conclude that Chomsky's criticism holds. Moreover, seeing the issue in that manner could enable one to decide which course of action among the alternatives pointed out above should be chosen; for it would point the arrows of the criticism to almost a particular place, and that place is the hard core of classical materialism. So rather than aiming at making modifications at the periphery, it would be more rational to aim at constructing a new view to account of the mind but still in the line of materialism.

1.2 Organization

The thesis is build up on three parts: materialism and its forms, criticisms of materialism and its forms, and finally a case study, which aims to show that methodological physicalism is more successful than materialism. The organization and contents of each part is outlined below.

In Chapter 2 definitions of materialism and its forms, namely reductive materialism, eliminative materialism, and functional materialism, are given in detail. This is necessary for the reason that in the following parts of the thesis these definitions are going to be challenged. Moreover, it is required to find out problematic parts of materialism and its forms, thus a good knowledge of what these are necessary. Chapter 3 is a complementary for Chapter 2, because materialism and forms of materialism all make claims regarding folk psychology and it is required to understand folk psychology.

The forth chapter is about the criticisms of materialism and its forms. This chapter tries to find out the parts of materialism that are not working. With this approach, it can be more plausible to introduce a new theory that can be able to overcome the problems of materialism and its forms.

The fifth chapter is a case study, which aims to show that methodological materialism can be successful in explaining the mind where materialism and its forms fail to do so. This chapter is composed of three different cases regarding the mind. Each case includes some elements that materialism cannot handle. The last part of these cases is a hypothetical case where a possible construction of mind is introduces and it shows how methodological physicalism can successfully explain this construction.

The last chapter will be the conclusion of the arguments that are given in this thesis. Cases where materialism fails and solutions of methodological physicalism, which successfully explains the constructions, will be discussed and finally directions for future work will be given.

CHAPTER 2

MATERIALISM AND FORMS OF MATERIALISM

2.1 Overview of classical materialism

Classical materialism is essentially the view maintaining that all real phenomena are physical. Classical materialism was constructed against dualist ontology. Dualist ontology claims that there are mental entities as well as material entities. This also implies that there are mental events in addition to material events. Moreover, the control mechanisms and laws that govern mental events are different from the ones that control material events. This is to say that the mental events can also interact with each other perfectly well. On the other hand, material events can interact with each other perfectly well. However, the interaction between these mental events and material events cannot be explained by any of the interaction methods. Thus, a new set of rules has to be introduced to handle the interaction between the mental and the material. However, it is claimed that this is the very point that dualism fails to account for.

Materialism - which is a form of monism in a broad sense - is a doctrine about the universe and thus having its own ontological commitments maintaining that everything in the universe is material. Thus, its definition becomes dependent on the meaning of “matter” (and sometimes “physical”).

However, since radical changes took place in modern physics, most

importantly the introduction of quantum physics, it is now not so much possible to give complete and sufficient definition of matter in terms of the classical physics, which is the foundation of classical materialism.

Therefore, without a proper definition of matter it is unlikely that materialism can be considered plausible or even implausible because materialism becomes meaningless. Thus, classical materialism becomes something bogus. Therefore, it has to be either revised (mostly changing its definition and ontological conceptions) or a new view of the universe has to be constructed. Before moving on and discussing how such a new form of materialism can be constructed, it is better to consider other forms of materialism and establish why they are also defective.

Classical materialism principally tries to give an account of the universe that is completely based upon the concept of "material" or "physical". Therefore, it says that the universe is nothing but different combinations of material components. This claim means that there is nothing beyond the material (physical) universe, and that there are no mental phenomena. This definition of classical materialism as if the one above completely denies any form of the dualist view claiming both mental and physical coexist. Therefore, we can say that the materialist view considers mental phenomena such as beliefs, desires and so on, are parts of the physical world, and in fact, they too are governed by physical laws. Accepting that mental phenomena are bound to physical laws is saying that the mental events are in fact just a form of physical events. What the so-called mental events have no additional properties than falling of a rock.

However, there are dualist-biased views in favor of the notion of mental states such as the notions "soul", "belief", which are considered as not only some states of the brain but some involvement of the personal soul. Because of such biased view (and even biased language), it is expected more involvement of mental events in everyday life. This biased view makes it even harder to accept that mental events are just events that are also governed by the physical laws of the universe. The reason behind this is the presumption that the mental events belong to a different

category from that of physical events. This presumption causes a belief that, there is another set of laws that governs the mental events. Moreover, since it is also the case that this set of laws is so distinct from the ones governing the physical events, one set of rules either physical or mental, cannot account for the working principles of the other. Thus, it claims that there are more to mental events than to physical laws, and that they are different from physical events of the universe.

However, as physical sciences show everything in the universe obeys the laws of physics. Therefore, if one commits to the idea that mental events are also governed only by physical laws then one has to admit that mental events are just physical events, and are nothing more. The only thing there is to discuss here is how to find out what the working principles of the physical events are.

Since the dualist view tries to explain events by classifying them in two different categories, which are mental and physical, it has to explain how mental events occur, but most importantly, it has to explain how the interaction between mental and physical takes place. If there is some explanation by dualists for this, 1) it has to include rules of how mental events occur, 2) rules about how they interact with each other and 3) rules that explains how physical events occur 4) rules about how physical events interact with each other and finally 5) rules that have explanatory power of how mental events can interact with physical events. The latest rule is required if mental events interact with the physical world. This is needed for the dualist view to be plausible to some extent; otherwise it would be impossible to explain how mental events affect the physical world and vice versa.

Trying to come up with and to establish the rules for the interaction taking place between mental and the physical puts dualism in a very serious difficulty. This is because there is no solid theory, which can give a sufficient explanation of the interaction between mental and physical phenomena.

At this point, materialism seems to most of the philosophers to be a better doctrine, because of its property of using physics as the basis, and employing its empirically successful theories in understanding the mind. Unfortunately,

materialism could not deliver its promises of explaining the working principles of the universe and the mind, because classical materialism has failed to accommodate the changes in modern physics. Moreover, it has been established that modern physics works better in explaining physical phenomena. This is achieved by giving a successful account of some physical events where the classical physics fails to do so, such as the phenomena including the subatomic particles and so on. Therefore, classical materialism, which was based upon the classical physics, losses its explanatory power because there is a better physical theory compared to the one that it employs.

While it seems that classical materialism can provide a better explanation of the universe and the mind as pointed out before, a careful inspection of classical materialism and its concepts reveals that there is a possible problem with the very core of materialism, which makes materialism fails to deliver its promises. Hence, to be able to see in detail what this problem is, first we have to understand classical materialism. Thus, in the following sections I will consider in detail classical materialism and then its different types (reductive materialism, eliminativism and functional materialism).

2.2 Materialism

As stated above materialism is a view, which says that everything in the universe is material. This view about the universe and about the mind emerged with the ancient Greek philosophers' conception of material. Naturally, it was developed and changed over time. I see no need to examine the early stages of materialism; rather for my purposes, it is better to consider classical materialism. Actually, the idea behind materialism has not been altered dramatically. It is still the same doctrine claiming that "Everything is material". Thus, materialism is still the view about things that exists. This implies that it has to contain certain ontological assumptions and entities in it in addition to its metaphysical character.

There are various reasons why materialism has to have some ontological assumptions. Some of these reasons are as follows. First, in its very core materialism

is a theory about existence of objects. Secondly, materialism has some important claims about the ontological entities such as saying that everything is material. In addition to that, materialism assigns ontological properties to entities such as the requirement of being physical in the classical sense. Because of all these reasons, classical materialism has to contain an ontological stand.

Materialism attracted many philosophers because it seemed to be the best alternative to dualism. Why did materialism seem so powerful and plausible for most philosophers and scientists?

Achievements in the modern sciences especially in physics helped materialism in becoming more plausible. This is because every development in physics improved he thesis of materialism that all phenomena were governed by physical laws.[3] This relation between science and materialism became noticeable especially with the rise of Newtonian physics. After that, with the developments in modern physics in the beginning of the twentieth century, it clinched to the success of science, and therefore improved the possibility that physical laws could explain the whole universe in its every aspect.

Here I would like mention an important issue about some other aspects of the effects of modern physics on materialism. Ironically, the same modern physics challenged materialism in the most serious way. Modern physics shows that the definition of matter in the classical sense is not tenable in this sense. For example, electromagnetic fields, which do not fit exactly to the definition of material in the classical sense because they are not observable as a planet for example, but they are obviously obey physical laws. Thus, using the terms "material" and "physical" became more and more problematic everyday.

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[3] Note that the current physics is not complete. We cannot expect from the current physics that it can explain every phenomena of universe. However, it is enough that physics showed potential to be able to do so in the future if it became complete. On the other hand, there is always the possibility that it will not be the case that the human kind obtains a complete physics, but in the course of developments, it is most probable that physics will evolve so much that it will be easily understood that it can explain everything eventually.

There also are many entities in quantum theory, which cannot be called physical in the classical sense, but they obey the laws of quantum physics, such as electromagnetic fields and so on. Thus these consequently show that the definition of material in classical materialism is not correct, which depends on the definition of matter (or material) defined by the contact mechanics. It simply became nearly impossible to defend it. In addition to that, because of the same reason that the definition of material is not plausible, defending materialism has virtually become very difficult.

Classical materialism mainly depends on the above concepts of "matter" and "physical", and its claims are based upon the employment of the definitions of these concepts. Therefore, if the definitions of these concepts are dubious it is not clear where to start to defend and to reject the doctrine. Thus after the classical definition of matter has been abandoned by modern physics it was required to revise materialism, or to build a new doctrine in the same spirit.

This new doctrine[4] is in fact a form of materialism. The new doctrine, however, does not commit itself to the core of classical materialism as other forms of classical materialism do such as reductionism, eliminativism; rather it tries to explain the universe by using the advances of modern physics. Moreover, the main difference between the new doctrine and some forms of classical materialism is that the new doctrine uses modern physics as a road map rather than to support its conceptions. Therefore, it is possible to construct a new doctrine that is capable of giving an account of how the mind works which materialism proposed to, but could not achieved. If we turn back to the subject at hand, since the increasing success of the empirical sciences from the beginning of the twentieth century materialism has become much stronger against dualist theories.

J.J.C. Smart defines materialism as follows "By 'materialism' I mean the theory that there is nothing in the world over and above those entities which are

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[4] I call this new doctrine "methodological physicalism".

postulated by physics (or, of course, those entities which will be postulated by future and more adequate physical theories)".[5] This definition is significant for the following reasons. First, it clearly identifies the ontological characteristic of materialism, which is claiming that everything that exists must be material as defined in the classical physics. It is important to talk about ontology that lies behind materialism. This is because it is a doctrine, which defines entities that exists. Moreover, it says that everything that exists has to be bound to physical laws. This is not to say that all entities are physical ones in the sense that we understand by today's physics. The reason behind that is classical materialism commits itself to the truth of the classical physics. Thus committing to the classical physics implies that classical materialism commits itself to the definition of physical in the sense of classical physics. On the other hand, the definition of physical in the sense of classical physics is different from the one given by modern physics. While the classical physics defines mater explicitly as, the fabric of which physical objects are composed. Modern physics, on the other hand, does not give a specific definition of matter; rather it first tries to establish the laws of physics, and then claims that everything that obeys the laws of physics must be considered as physical. Thus, classical materialism loses out some physical entities, which do not fit in to the definition of the classical physics. Classical materialism also claims that these entities have to be governed by physical laws.

The second one is that it clearly points out that materialism has epistemological characteristics as well as ontological and metaphysical ones. Materialism by definition is a theory with an ontological commitment, it has to have some theoretical entities.

Moreover, as I see it, the epistemological character of materialism shows itself when discussing the more specific types of materialism such as reductive materialism, eliminative materialism. The reason is simply that the specific types of

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[5] Smart 1963, p 651.

materialism are theories, which use materialism as a basis. Thus, there occur changes in theories, reductions between two theories and elimination of theoretical entities and such. I will discuss each of the issues in the following sections where appropriate.

Classical materialism is important for the philosophy of mind because it makes fundamental claims about the mind. One of the claims of classical materialism is that every entity in the universe is material. This claim affects working and structure of the mind fundamentally compared to other accounts of the mind. This is because since classical materialism assumes that everything is physical, it tries to give an account of the mind, which only depends on physical laws. Since every entity is physical, the so-called "mental events" have to be either physical or have be governed by physical laws. However, dualist approaches say that this is not the case. In dualist approaches there is a clear-cut distinction between mental events (and entities) and physical events (and entities).

This distinction is the source of the well know mind/body problem.[6] I do not want to spend more effort on this distinction because I see it as a conclusion of a misunderstood problem, thus saying that in fact such a distinction between mental and physical does not exist.

Russell makes a remark about this distinction in his *Analysis of Matter*. He says, "The distinction between mental and physical in philosophy is superficial"[7]. What I will do while constructing a new materialism will also include how mental and physical are in fact the same concept of universe.[8] Thus, there is no distinction between mental and physical. On the other hand, it is most likely the case that the mental and the material are different interpretations of the same concept of the

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[6] I will not go into details of dualist arguments. Dualism has a very clear distinction of mental and physical. Moreover, what I would like to do is to show that in fact no such distinction is required in order to explain the mind and working of it.

[7] Russell 1927. p 287

[8] This appears to be very similar to William James's neutral monism at first glance. However, it is not the case, what I will try to construct is different from that.

universe. Because the so-called mental events are in fact the results of the operations of the brain, as opposed to dualist views, which claims it cannot operate over the physical rules, the mental events are just a naming for physical events in the brain.

I believe that this much is enough for materialism in general. Next, I will talk about reductionism, functionalism and eliminativism. Above three are the best possible forms of classical materialism. This is because there is a substantial amount of work done in those areas; it is easier to see the defects in them. In addition to that, these three types of classical materialism also have very clear definitions that are mostly agreed on by their defenders. For example Putnam's "*Minds and Machines*"[9] for functional materialism, Quine's "*Word and Object*"[10] for eliminative materialism and Churchland's "Neurophilosphy"[11] for reductive materialism can be stated here. Thus, they do not require further discussion about their definitions. This helps me to keep discussion limited only to the criticisms of the specific types of classical materialism. In this section of the study, I will give a short outline of each of them. After outlining each of the three types of materialism, I will point out the criticisms of these views in order to construct the methodological physicalism. I will start with reductive materialism then continue with functional materialism and finally outline eliminative materialism.

2.3 Reductive Materialism

Giving a definite account of reductive materialism (reductionism for short) requires a good understanding of the term "reduction", and in what sense it is used by philosophers. Reduction in very basic sense is a relation between theories. This relation can be formulated in the following way. First, there must be two theories, one is generally called the base theory and the other is the reduced theory. Patricia

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[9] Putnam 1960 "Minds and Machines"

[10] Quine 1960 *"Word and Object"*

[11] Churchland, P.S. 1986: Neurophilosophy: Toward a Unified Science of the Mind-Brain.

Churchland calls this type of relation intertheoretical reduction.[12] Generally, the reduced theories' domain is much concentrated on a single subject, thus talking about very specifics of an issue. Whilst the reduced theory is more specific, the base theory covers more ground. In the sense of explanatory power both theories in the long run have to be comparable in order to achieve a complete satisfactory reductions.[13] These theories also have to be logically derivable[14]. This reduction is generally achieved by the introduction of "bridge laws". This is reduction in general.

It can be easily applied to related theories where one has the features of a base theory and the other has the features of reduced theories. Intertheoretical reduction can help us in understanding the subject. Most importantly intertheoretical reduction simplifies the explanations of the reduced theory. In this sense, the reduction creates an explanatory unification. In addition to explanatory unification, reduction may also create ontological simplification. This is since we reduce the reduced theory to the base theory there will be no more need for additional ontological entities, which are defined by the reduced theory. Ontological simplification causes us to have less number of initial premises, thus having less chance of one or more of them being wrong.[15]

Obviously, there is too much to discuss about theory-reduction. There are problems with reduction independently of a specific subject, such as whether a smooth reduction between theories is possible or not. Such problems are independent of the subject, and can occur in any case of reduction.

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[12] Churchland 1986 p 8.

[13] It is obvious that there are many things to consider for a relation between theories. Patricia Churchland identifies these as following; domain specific boundary conditions, limiting assumptions, approximations and most importantly as I also pointed out bridge laws or principles.

[14] This is an essential property of a relation to become a reduction. Otherwise, it is impossible to have a reduction between theories.

[15] This can be understood as elimination of those entities. However, it is not the case. Those entities within the reduced theory in fact never eliminated from theory. They still exist in the reduced theory but not in the base theory. Furthermore, in the case of elimination those entities are eliminated from any consideration.

There is more to discuss about reductive materialism. Reductive materialism claims that folk theoretic claims about the mind can be reduced to those of a neuroscience. Folk theory of the mind has its own ontological entities and in addition to them, it has its own theoretical laws. Folk theory of the mind distinctly identifies mental and material components of the mind. Therefore, in folk theory two distinct ontological components construct the mind as a working system. This distinction requires an account of how interaction between the two elements of the mind occurs. Thus, it is also required to introduce some additional rules into folk theory, which can account for this interaction. Reductive materialism claims that these rules of folk theory of mind can be reduced to those of a neuroscience. Thus in the very basic sense, reductive materialism says that mental states can be reduced to brain states. This is not to say that mental states are eliminated from our ontology. Rather it is saying that the brain states can explain the working of the mind in a simple way.

2.4 Eliminative Materialism

Eliminative materialism is somewhat similar to the reductionism. Both doctrines' aim is to establish a more empirical understanding of the mind. While their aim is to find essentially a better theory than folk psychology, their methodologies to do so are different. Eliminative materialism, unlike the reductionism –which reduces one theory to another-, eventually tries to abolish folk psychology completely. Eliminative materialism assumes that folk psychology is fundamentally false and there is no possible way for a smooth reduction in the sense that reductive materialism tries to achieve. So folk psychological ontology, principles and concepts have to be displaced by those of a complete neuroscience. This replacement will cause the conceptions and principles of the mind, which are used in folk psychology, completely removed from our ontology. Thus, the eliminativism principally says that there are no such things like everyday notions beliefs, desires and so on, which are very acceptable for a dualist approach. Thus eliminating them

will lead to a purely neuroscientific[16] notions of brain and purely material brain states. An especially important reason for this elimination is that folk psychology is a seriously false theory, including its ontological commitments, principles and laws. Since eliminative materialism takes for granted that folk theory has such essential problems such as being fundamentally wrong and having no empirical importance, eliminative materialism tries to replace this theory by preferably a superior neuroscience. During this process, eliminative materialism also claims that all the old concepts of folk theory have to be eliminated.

2.5 Functionalist Materialism

Functionalism is the doctrine according to which mental states and properties are functional states of the brain. Functionalism claims that the significant item regarding the mind is function, and the remainder is not important. Moreover, it adds that we can replace folk theory of the mind by an empirical theory, which claims that the mind can be replaced by information processing. Thus, claiming that consciousness and every other aspect of the mind can be captured and explained as being some form of computation. A good example for defining functionalism is the following "… for an organism to be in pain is for it to be in some internal state that is typically caused by tissue damage and that typically causes groan and winces and other characteristic behavior."[17] This example particularly shows the possibility that, mental states in fact can be considered as brain states. It also shows the possibility that "the material of construction" is not important but the function of an entity is the essential property. Thus if we have aliens that have the same functionality then they will react in the same format as a known organism. Moreover, the cause of the pain also will be the same.

This issue also raises the problem of "multiple realization" (MR for short). About MR Jaegwon Kim states the following:

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[16] It is obvious that this notion of neuroscience is a superior form of the current neuroscience. Thus it is an expectation. that a more developed neuroscience can explain the brain states.

[17] Marian David 1997. p 133-148

> We are constantly reminded that any mental state, say pain, is capable of "realization", "instantiation", or "implementation" in widely diverse neural-biological structures in humans, felines, reptiles, mollusks, and perhaps other organisms further removed from us. Sometimes we are asked to contemplate the possibility that extraterrestrial creatures with biochemistry radically different from the earthlings', or even electro-mechanical devices, can "realize the same psychology" that characterizes humans. This claim, to be called thereafter "The Multiple Realization Thesis".[18]

Furthermore, the functional materialism can be regarded as a type identity theory.[19] The reason is that hard-core functionalists[20] say that every mental state can be replaced by a functional state. In this sense, it can also be said that functional materialism is also a reduction. Being some form of reduction, the functionalist materialism also has many problems as reductive materialism does and many of its own. For example, while claiming that every mental event is in fact some brain state, functionalism fails to capture the qualitative character of experiences. There are more arguments against the functionalism such as the "Zombie argument" by Chalmers in his book *The Conscious Mind.*[21] Thus, it cannot be regarded as a successful and a better form of materialism.

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[18] Kim 1992. p 1.

[19] The identity theory of mind claims that states and processes of the mind are identical to states and processes of the brain.

[20] The term is used by Marian David in his paper , "Kim's Functionalism" p 133-148

[21] Chalmers, D. 1996 p 94.

CHAPTER 3

WHAT IS FOLK PSYCHOLOGY

All the forms of classical materialism and even physicalism have claims concerning folk psychology (FP). Followers of both of the two camps mainly claim that FP is not a scientific theory, and therefore has to be denied. Thus, both the two camps have claims about how FP fails to prove its claims. Therefore, it is important to understand what FP is and what claims it makes.

In the most basic sense, FP is a view that tries to explain the mind. However, FP does not depend on scientific evidence, it is not constructed as a theory such as having assumptions and testing ground for those assumptions, rather it uses the common sense knowledge and observations, unlike the materialism and physicalism. Simply FP is our everyday understanding of the so-called “mental states”. This definition assumes that mental states already exist and they are not governed by physical laws. If it were, FP would also commit itself to physical laws, and there will be no need for it. However, FP tries to explain the so called the mental states by its own; thus assuming the physical laws are not applicable to mental states. This property of FP is not acceptable by a materialist understanding, because FP assumes that there is a distinction between mental and physical phenomena. However, my concern here is not to discuss about the correctness of FP, but rather to provide an understanding of it.

FP claims that our mental capabilities, such as beliefs, desires, pain, and so on, are presented to us, thus claiming that in an epistemic sense we already know every aspect of them. Thus, FP is the theory that tries to explain human behavior.

To achieve this, however, it uses common sense observations of everyday life. Thus, it lacks the properties of being a scientific theory and it is changes from person to person, who makes the observation. Thus, having no reliable data to work on.

FP became vibrant after behaviorism had been widely accepted as a failed approach. In a search for a replacement of behaviorism cognitive scientists leaned towards a common sense explanation of the mind. In establishing this new theory of the mind a similar approach used by cognitive scientists which was used in constructing (or defining) folk physics.

Folk physics is simply the theory that helps to explain physical events in nonprofessional terms and observations. Folk physics is a theory that covers the dynamics of "normal" sized physical objects. It has constructed on everyday observations of those physical objects and common sense understanding of their movements, interactions and so on. This approach to create a theory based on common sense became attractive to cognitive scientists to replace behaviorism. Because of this, a theory of the mind was constructed in the same way, by using common sense knowledge and observations, to explain the mind and it was named folk psychology. Therefore, what FP does is very similar to folk physics in method, which is explaining some phenomena by just employing commonsense observations of some phenomena.

However, cognitive scientists departed from FP and developed other theories that also began to challenge it such as connectionist models and so on. They also claim that connectionist models for example can falsify FP. In defense of FP for such an attack, Egan says "... connectionism's prospect of providing a much hoped for vindication of commonsense psychology does not justify the claim that connectionism implies the falsity of folk psychology, just as quantum physics' failure to vindicate our commonsense ontology of middle-sized objects does not imply that there are no tables or chairs".[22] Thus, Egan claims that FP enjoys the same privileges over a scientific theory of the mind, as folk physics does over quantum physics.

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[22] Egan 1995, p 180.

This argument in my opinion does not help FP much in saying that it is not falsified. On the contrary, it can only be interpreted as a failure of FP for the following reasons. First, claiming that FP is correct because folk physics is correct is not saying anything because there is no evidence that folk physics is correct, thus it is not conceivable to believe that FP is also correct in the same sense. Secondly, folk physics is composed of just commonsense observations, and there is no empirical data from those observations. Thus, folk physics is just a mere collection of speculations. It easily varies as the observer changes. In this sense if FP is similar to folk physics in construction then FP is also constructed by just using observations that have no empirical significance whatsoever and it is also depends on observers. Therefore, it is safe to say that by making the analogy between FP and folk physics cannot show the correctness of FP. However, it can only be used to show that FP is also weak and unreliable as folk physics.

In addition to the arguments above, it can also be claimed that if FP is similar to folk physics, then it also lacks a great amount of explanatory power. It is trivial to understand that folk physics cannot explain the universe as well as quantum physics does, thus lacking explanatory power. Therefore, if we continue to use the above analogy that FP and folk physics are so similar in construction then it is also possible to say that FP cannot explain the mind as good as a philosophical theory of the mind (such as materialism, physicalism and even dualism) or a neuroscience does. As a conclusion, it can be said that FP is a theory that does not accounts for the available empirical data correctly.

Moreover, it can even be maintained that FP is not a scientific theory. It is just a collection of commonsense observations about the working of mind.

At this point the eliminativist and the functionalist theories assume that FP is a false theory. In fact, this is where the eliminativism and others fail in their assumption of accepting that FP is a theory in the first place, while making claims about FP. There are two important points here to discuss. Firstly, the eliminativism and other forms of materialism claim that FP is false. This is a very important claim. However, not all the forms of materialism can explicitly show how and why FP is

false. The reason behind this failure is in fact FP might be very well correct in the sense of what it is trying to say. That is, FP is just the collection of commonsense observations concerning everyday aspects of the mind. Therefore, they might be very accurate given what portion of the mind can be observed from outside and of course in a very limited sense. In FP, there is no intensive experimenting or collecting empirical data and trying to establish a hypothesis and testing of such a hypothesis. Thus, the observational results of FP are very trivial, and thus can easily be said that they are true. This is because they are just like watching a falling rock and making claim that the rock will fall until it hits the surface that supports it and so on. Thus being trivial in that sense the claims of FP might not be said to be false, and thus, saying that FP cannot be false also. This can show that materialism and its forms first of all fail to understand FP. In fact, it can be true in a very limited sense, but certainly not to be claimed to be obviously false as they have claimed so.

Secondly, the eliminativism and the reductionism presume that FP is a theory. It can be interpreted that assuming FP as a theory is necessary for the eliminativism and the reductionism. This is because both these forms of materialism need a theory (a false and/or obsolete one) in the very first place. Thus, they can present their claims in a more plausible way. The reason behind this need is very simple. The reductionism and the eliminativism both need a theory because they have to either reduce it or eliminate it.

However, FP fails to be a theory in the sense that the reductionism and the eliminativism need. There are various reasons why FP is not a theory as in the sense that the forms of materialism need. Firstly, both of the forms need a theory that has a very clearly identified set of assumptions, set of conclusions, set of theoretical entities, ontological claims about the domain of the theory, and thus it must have some ontological entities. On the other hand, while FP seems to comply with most of the above requirements, it in fact fails to do so; for it is just a collection of commonsense observations regarding the mind, and thus not having the sufficient properties for being a theory. Therefore, it can be maintained that FP is not a kind of theory that the reductionism and the eliminativism needs in order for them to be

correct. Thus, I believe that making claims about the correctness of FP from a point of the reductionism and the eliminativism is a needless and endless effort. Because, FP tries to understand the mind from a commonsense point of view, reductive materialism and eliminative materialism, however, tries to give an account of the mind by using physics and neuroscience. Thus, the path of FP and materialism are so distinct that there should not be need for rejecting FP from a point of materialism. This in fact makes the claims and results of the reductionism and the eliminativism unreliable and somewhat dubious, for that they use a theory that is not compatible with their methods of reduction and elimination.

It is now established that FP cannot said to be false as the eliminativism and the reductionism claim. On the other hand, it cannot also be said that it is correct in the sense that it can explain the mind and its working principles correctly. Moreover, it is also clear that FP is not a theory, which is suitable for any form of reduction. To sum up FP is not a doctrine like materialism or dualism, rather it is a simplified way of interpreting the observations of individuals regarding their "mental states". It is because of this reason it should not be considered as a doctrine like the ones above and thus an approach different from those of the aforementioned to FP should be employed.

Paul Churchland says "It is a framework of concepts, roughly adequate to the demands of everyday life, with which the humble adept comprehends, explains, predicts and manipulates a certain domain of phenomena".[23] Thus, FP is a framework of concepts that are related to the working of the mind and it is a collection of the commonsense observations that are related to the mind. He then concludes, "It is in short a folk theory". If it is a theory, then FP is like folk mechanics, folk biology, folk physics and so on. Thus, FP is certainly not a theory in the sense that the eliminativism wants to use for eliminating it and similarly it is not a theory in the sense that the reductionism wants to use for a base theory to make

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[23] Churchland 1989, p 227.

reductions from FP. Both the reasons are to be described in more detail while discussing each doctrine. FP is being the self-understanding and it can change in time. It is not possible and plausible that FP can enjoy the privilege of being an ultimate theory and having no need for change, in the course of development of the modern sciences. While Churcland assumes that FP is a theory and is either to be eliminated and replaced, the mistake in this understanding of FP as a theory can be candidate to those actions. Thus, by using the same assumption it can be said that folk physics has to be replaced or eliminated by a superior physics, maybe by the current state of quantum physics.

However, this is the crucial mistake Churcland is making. Even if it is assumed that FP is a theory, there are still problems. For example, the rules of reduction have many preconditions, which have to be satisfied, such as boundary conditions, assumptions, approximation and so on for two theories to be used in a reduction. Nevertheless, it is clear that (assuming that FP is a theory and satisfies at least one of those conditions) the structure of FP, as a theory does not allow it to become a candidate for reduction. This point is important because it identifies some major defects of the reductionism and the other forms of materialism, which depend on similar basis, such as the eliminativism and the functionalism. The proper action here is to see FP as a completely different approach to the mind. Thus, the domains of arguments between FP and the reductionism, the eliminativism have to be separated from each other. This is just claiming that classical materialism and FP are so different in nature that they cannot be discussed in the same context , even though both tries to explain the mind.

It now has to be understood that FP might be a theory, but it clearly does not have the necessary and sufficient conditions to be a candidate for elimination or a reduction. Churcland while claiming that FP is a theory she also shows that it also has some problematic issues to be completely regarded as a theory in the sense that reduction requires. She says, “The simpler parts of folk psychology are transparently casual or nomic in character, and the more complex parts have the same sophisticated logical structure typical of our most powerful theories”. In this case, the

problem is clearly in the non-logical part of FP. Thus, any doctrine, which tries to accomplish its proposed results by any form of reduction by using FP as a base theory is bound to fail.

Churcland claims that FP is a theory (even if partially). Thus, it has to be processed as a theory. Since Churcland believes that it is not completely true, she claims that there is a need for a reduction and or elimination of its ontological entities. Its laws must also be changed. However, I see that, as Churcland also does, FP cannot fulfill some of the requirements to become a theory to be a base for any reduction. This also implies that any theory that uses FP in the reduction will eventually fail, because of the reason that FP does not satisfy the preconditions for a reduction that are given above. Thus, I propose that it is possible for FP to coexist with a superior neuroscience as folk physics has coexisted with modern physics and so on.

On the other hand, the failure of the doctrines that uses FP as a base is not because of deficits in their methodologies, rather the problem lies on their selection of FP as a base theory for their reduction/elimination. This problem can be overcome in the following way. The proposition for the solution of FP problem is in the analogy of where FP started. If FP is a theory, which is like folk physics, folk biology or so any other folk theory, then the solution is the coexistence of FP with a superior neuroscience. This is the case with both folk physics and folk biology. In both cases a folk theory and a scientific theory can co-exist together. While the domain that they try to explain is the same, methodologies and the explanatory powers and thus every component and every property of folk theory and scientific theory are different. In this case, of course the scientific theories have more explanatory powers, but are less accessible to everyday man. Nevertheless, because they are more accessible to everyday man, they seem to create an illusion that they can cope in a much better manner with phenomena that they try to explain.

As a conclusion, FP and a superior neuroscience can coexist; their explanatory powers and degree of correctness will obviously be different. Moreover, FP cannot be completely falsified because of its characteristics as a collection of

commonsense observations. Each observation is more or less personal, and can differ among individuals. Thus, I believe that trying to falsify FP is not a worthy effort. The important course of action at this point is to accept that FP and some superior neuroscience can coexist together and much more importantly, it is the evolution of the present neuroscience that can explain the mind in much better way with the help of a better-constructed form of materialism.

CHAPTER 4

CRITICISMS OF CLASSICAL MATERIALISM AND ITS FORMS

Having outlined materialism and some forms of it, now I can move on to identify their defective sides. It is obvious that materialism, even the different forms of it, could not deliver their promises. It is still required to show why this is the case even it is obvious why and how they failed. Since it is an incomplete doctrine, it is not rational to continue studying materialism. However, it is still better to show the reasons why.

4.1 Criticisms of Reductive Materialism

Reduction in the sense that it is used in the philosophy of mind is the claim that folk psychological theory of the mind has to be reduced to a neuroscience. Besides the problems regarding folk psychology and neuroscience there are also some problems about reduction in general. Since my main concern is reductive materialism, I will integrate criticisms of it with the problems of reduction that are related to the philosophy of science.

Firstly, it is important to discuss what intertheoretical reduction is and what are the formal requirements for theories to be used in such reductions. Ernest Nagel claims that there are two parts in the discussion of reduction. The first part is concerned with the formal characters of the theory and the second part is about the factual or empirical characters of the theory. Regarding the first part, Nagel claims,

"it is an obvious requirement that the axioms, special hypothesis, and experimental laws of the science involved in a reduction must be available as explicitly

formulated statements, whose various constituent terms have meaning unambiguously fixed by codified rules of usage or by established procedures appropriate to each discipline".[24] This is a very important remark because Nagel also maintains that if this fundamental requirement is not satisfied it cannot be guaranteed that one scientific theory could be reduced to another. Nagel concludes with the following statement that there are four important statements for a science to be autonomous. These statements are, a) the theoretical postulates of S[cience], from which the theorems are derivable from them, and the coordinating definitions should be associated with theoretical notions in the postulates or theorems; b) the experimental laws of S; c) the observation statements of S; and d) the borrowed laws of S.[25]

Regarding the second formal consideration on reduction Nagel says, "Every statement of science S can be analyzed as linguistic structure, compounded out of more elementary expressions in accordance with tacit or explicit rules of construction.".[26] Regarding the third and the last formal consideration on reduction, he makes the following remark: "The primary and secondary sciences involved in a reduction have in common a large number of expressions including statements that are associated with the same meanings in both sciences".[27]

As for the second part, Nagel discusses the non-formal conditions on reduction. However, for the sake of argument the formal considerations on reduction will be enough to show that reductive materialism fails in reducing folk psychology to a neuroscience.

So, let us examine the case of folk psychology and neuroscience under the formal conditions that are given by Nagel. As I quoted, earlier Nagel says, "It is an obvious requirement that the axioms, special hypothesis, and experimental laws of the sciences involved in a reduction must be available as explicitly formulated

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[24] Nagel E. 1961, p 46.
[25] Nagel E. 1961, p 46.
[26] Nagel E. 1961, p 47.
[27] Nagel E. 1961, p 47.

statements".[28] In this case folk psychology might have all the above, but none of these is explicitly formulated in folk psychology because they are constructed as results of commonsense observations. Therefore, folk psychology does not have any of the above as in the formal requirement of formulated statements. Therefore, it cannot be possible to use folk psychology and neuroscience in such a reduction. This does not mean that folk psychology is useless or not has any properties usable by science but rather it means that folk psychology cannot be reduced to a neuroscience.

Now I will discuss the reasons why folk theory of the mind (folk psychology) cannot be reduced to a neuroscience in the light of Nagel's requirement. The most important problem is that folk theory of the mind is not a genuine scientific theory. It lacks the most fundamental properties of a science, namely being autonomous, and thus cannot fulfill requirements specified for the first formal consideration for reduction. This is required to be established because for reduction to take place there has to be two theories in present. This construction of FP unfortunately cannot be considered as a theory because of the reasons such as having no theoretical laws and so on. The first formal consideration out of the four important elements Nagel gives, folk psychology cannot meet. First, folk psychology does not have the property of having other theorems derivable from it. For this to be fulfilled, a theory and the derivable theories must be logically derivable from each other. However, folk psychology lacks a certain necessary logical foundation. Secondly, there are no experimental laws of folk psychology, because FP only depends on commonsense observations of the mind and it is perfectly natural that each individual may have his or her own set of observations that are distinct from the others. Thus, it is not possible to construct a set of experimental laws for folk psychology, thus FP also fails to meet this requirement. Finally, there are no borrowed laws of folk psychology from other scientific theories because there are only commonsense observational statements in folk psychology. Thus, failing to have these requirements as Nagel claims the most fundamental formal conditions for reduction it can be said that folk

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[28] Nagel E. 1961, p 48.

psychology is not suitable to be used in such a reduction. Moreover, by failing to meet these requirements it is also not plausible to accept folk theory of the mind as a proper scientific theory. Consequently, it can be said that reductive materialism has serious drawbacks at the very basic level. reductive materialism tries to achieve an intertheoretical reduction by using two theories where one of them is not a scientific theory.

It can be asked why we need scientific theories for reduction. One of the very fundamental requirements of reduction states that two theories have to be logically derivable from each other in order to have a reduction. The condition of logically derivability is one of the most important requirements for a successful reduction. Thus, any doctrine that makes use of reduction has to comply with this criterion of logical derivability.

However, it is not possible to derive logically any scientific theory from folk theory of mind, which is simply the collection of commonsense understanding of mind. This is because commonsense view about working of the mind cannot be represented by a formal logical model. Hence, it is not possible to represent logically folk theory of the mind by, and there is no possible way to derive logically a neuroscience from it. Furthermore, because folk theory of the mind cannot be considered as a scientific theory, it seems equally impossible to introduce bridge laws between neuroscience and folk psychology, as it is impossible to achieve any logical derivability between the two. Above two requirements are considered as the most fundamental conditions for a reduction between two theories to take place. However, it is very clear that theory of the mind does not fulfill those requirements. Even the incompatibility of FP for reduction is enough to reconsider the plausibility of reductive materialism. However, there are more difficulties to consider including domain specific boundary conditions, limiting assumptions, approximations and so on.

Unfortunately, these are not the only problems reductive materialism faces. As a base approach, it uses reduction. However, it is not the case that reduction is free from discussion and considered completely reliable. Many philosophers of

science say that reduction itself is not a plausible approach in science. Thus in addition to the above problems, there are also problems that are generally related to reduction, which prohibit the doctrine to deliver its promises; and consequently cannot be a very successful alternative to other views about the mind. Despite the problems related to both the internal structure of reductive materialism and to reduction in general, the ultimate objective though not as it stands that reductive materialism tries to reach is still a very plausible one. It is simply changing the unscientific concepts into scientific ones, and creating a scientific understanding of the mind accordingly. This is the case because the success of the modern sciences shows that a scientific approach to a phenomenon has a greater possibility of giving a successful account for it.

4.2 Criticisms of eliminative materialism

Eliminative materialism claims that essentially folk psychological notions about the mind will be replaced by those of a successful neuroscience. Such as pain, beliefs, desires and so on are just names for some brain states, they need to be eliminated, and a possible future neuroscience will explain those brain states better. It is embraced by many philosophers, such as Quine, Stich and so on, in the cases where reduction seems to fail.

However, like reductive materialism, this eliminativism also fails to deliver its promises. This is because with the current state of neuroscience for most people folk psychological concepts work much better. For example we do not see many people saying “My C-fibers are fired when I touch the fire”. They most likely to say, “I felt a pain when I touch the fire” and so on. Jeffery Foss[29] says that by this line of thought he can easily refute eliminative materialism because the current state of neuroscience is not developed enough to be useful for humans and he claims that in this case FP works better in nonprofessional terms.

However, this argument is never sufficient to refute any claim of eliminative materialism; for the reason that having an explanation of a phenomenon in

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[29] Foss 1995. p 403,

nonprofessional terms may not amount to a good enough explanation of the working principles and underlying structure of the phenomenon. Thus, this argument must be supported by providing further reasons. Otherwise, it cannot be used in refuting some theory alone.

There are many aspects of the brain that current neuroscience can explain but folk psychological one cannot; such as information exchange process between the neurons, the principles behind the firing of a neuron and so on. Thus, to be able to say that the eliminativism cannot deliver its promises, one has to state additional fundamental reasons against it.

Moreover, assume that human kind can achieve a superior neuroscience, which can explain every brain state, and then will it be the case that folk psychological notions be in fact eliminated? It is highly possible that neuroscience in the future will be able to identify most of the brain states and provide successful explanations. This can be achieved by exploring and understanding most of the crucial activities in the brain and mapping them to some brain states. Thus those folk psychological concepts, which are introduced by a dualist view, will be nothing but only brain states. On the other hand, it is still possible that ordinary men will continue to use those nations of FP. Hence showing that, beliefs, desires and other folk psychological concepts are nothing, but claiming that these seem to be some brain states will not eliminate them. Most possibly, it will be the case that those concepts will coexists with those of this superior neuroscience. In such a case beliefs, desires and others will not be ontological entities of folk psychology as they are now, but they will be just shorthand for some brain states. Eliminative materialists spend most of their effort to discard these notions of folk psychology such as beliefs, desires and so on. However, what they cannot see is that in fact there is no reason to do so. Folk psychology is not a scientific theory. Eliminating a non-scientific theory does not require this much effort as eliminative materialists have. In the course of the natural development of neuroscience there will come a point at which folk psychological notions about the mind will be obsolete. Still trying to eliminate them is unnecessary because it seems possible that folk psychological concepts will be

changed, and find some place in a future neuroscience but not in the sense that they are used today.

So, eliminative materialism tries to provide a scientific explanation of the mind. However, the way it has preferred to achieve that goal makes it unsuccessful, because it becomes weak in many points. For it is too early to say that neuroscience will come out to be the way that eliminative materialist has projected. Additionally, there is no need to eliminate folk psychological notions about the mind. The best possible approach for eliminative materialism will be to redefine them in the light of a superior materialism and use those concepts as efficiently as possible.

At this point, the objection may seem to be in favor of dualism but it is not the case certainly. The final destination that eliminative materialism wants to reach is the best possible scientific explanation of the mind, but it is also clear that the method, unnecessary elimination of the concepts of folk theory, it chooses does not seems to be viable. This prevents eliminative materialism from achieving more with receiving fewer objections.

4.3 Criticisms of Functional Materialism

It can be said that the functionalism is a type of reductionism, because the functionalism claims that every brain state can be reduced to some functional states. Consequently, it suffers from all the problems that affect the reductionism. This, however, can be maintained against only for a kind of functionalism, which Marian David calls hard-core functionalism.[30] Definition of it is as follows: "hard-core functionalism is a theory of mental states in the sense of state types or properties".[31] This definition may have problems. However, those are related to mental states as defined in the dualism such as the interaction of the mental and the physical. Those problems not specifically cause a hindrance for the functionalism, but it affects materialism in general.[32] Therefore, there is no need to consider those problems right now. However, the hard-core functionalism definitely suffers from the problems of

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[30] Marian David 1997, p 133.
[31] Marian David 1997, p 136.
[32] Issues related to mental events, like do they really exist or not is a general problem while constructing a doctrine. My aim is to point to those issues in later papers of my research.

the reductionism. Therefore, there is no need to go over again the issues since they have been discussed above.

What is more interesting in this context is Kim's Functionalism. It is appealing because it does not agree with most fundamental points of the hard-core functionalism. It seems that it can improve the hard-core functionalism against the problems of reductionism. Kim suggests that local reductions are possible. If this is possible, Kim's functionalism can overcome the problems that cause reduction to be only partially successful. If Kim's functionalism can overcome some problems of reduction then it is possible to use it to construct a new type of materialism. First, it is better to identify some aspects of the hard-core functionalism, and compare them with that of Kim's functionalism. Marian David identifies these fundamental points of the hard-core functionalism. These are as follows; (a) mental states are identified with functional states; (b) mental states are identified by physical states and they are multiply realizable and finally (c) it is a form of reductionism. What I am concerned with is MR; Elliot Sober makes it very clear that MR can be used against reductionism[33]. Therefore, (b) is not fully defendable. Finally, (c) is very clear. It is established that reductionism is not working. Consequently, it can be said that "the hard-core functionalism" cannot be considered as a plausible form of materialism. Then what is so different in Kim's functionalism that it can help to improve classical materialism? First, Kim also does not acknowledge the existence of mental states. Marian David says that Kim's functionalism does not allow for MR.[34] Thus, it can avoid certain problems of reductionism that are caused by MR arguments against reductionism. Finally, Kim's functionalism is clearly a form of physicalist reductionism. It seems that Kim's functionalism can overcome many obstacles, which other forms of materialism have failed overcome. However, there are certain problems with it as well. For example, there can be situations where local reductions may not work as supposed to work, thus causing problems.

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[33] Sober Elliot 1999. p 543.
[34] Marian David 1997, p 137.

4.4 Overall Criticisms

The aforementioned criticisms allow me to make the following remarks. First, in all the forms of classical materialism there are problems associated with reduction, either explicitly or implicitly. Second, in every type of classical materialism, there are problems regarding their basic definitions. These are related to concepts of "material" and/or "physical". These are the fundamental reasons why classical materialism and its forms are bound to fail.

The current state of argument requires locating the sources of these problems. After successfully locating them, it will be much easier to find solutions to these problems. There are two ways in which possible solutions can be offered. First, after locating the source of problems, it is possible to modify them to achieve a much more plausible version of classical materialism. Second, and the more convenient way is to re-define those sections so that classical materialism will not have these problems. Here the Duhem Thesis[35] provides a perfect tool to identify the problems that reside in classical materialism. Popper identifies the power of the Duhem thesis in the following statement, "…the way in which the falsification of a conclusion entails the falsification of the system from which it is derived"[36]. Regarding the Duhem thesis Grunbaum says,

> It is an elementary fact of deductive logic that if certain observational consequences O are entailed by the conjunction of H and a set A of auxiliary assumptions, then the failure of O to materialize entails not the falsity of H by itself but only the weaker conclusion that H and A cannot both be true[37]

The Duhem thesis claims that in a theory there are several components, which are related to each other. These are the core theory, assumptions of the theory and finally auxiliary assumptions of the theory.

Now let us examine the Duhem thesis in more details. One theoretical system (H /\ A) was tested and falsified as a whole and modify A into A1 and test it again. It

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[35] Duhem 1906, p 132; Quine 1953 p 20-46.
[36] Popper 1972. p 55.
[37] Grunbaum, 1976, p 76.

was found that A was modified, and repeats this n time. Then what we have a series of falsified theories: (T /\ A) /\ (T /\ A2) /\ ... /\ (T /\ An). So we can write this series as (H, A, A1, A2,...,An). Now:

1. If we think that H is T then all As were F. Thus, this will give us a unique truth value <T,F,F,...,F>
2. However, if we think that H is F. Than depending on the observational consequences As would be either T or F. This would result in 2^{n+1} truth values. Namely (F, T/F, T/F, ..., T/F). Thus the probability of H being F is 2^{n+1} / $1+2^{n+1}$ will approach to 1 where n goes to infinity.

Thus, this would establish two things

a) Probabilistically supports Duhem's strategy that H is false

b) To justify repetition of the experimental tests.

In the case of classical materialism and its forms, the Duhem thesis will be utilized in the following way. Firstly, it will show why all forms of materialism fails. This is because any form of materialism just tries to change the assumptions and auxiliary assumptions of materialism. Even though if it is assumed that all their new assumptions and auxiliary assumptions are correct, again they will most likely fail to deliver their promises. In this case, it can be identified of course with some degree of certainty that the problems are in fact in the core theory, rather then in the set of its assumptions. Therefore, I can say the core of materialism has some part that has to be modified to be more plausible. Secondly, the Duhem thesis will be utilized to show that, the new doctrine is more plausible then others. This can be achieved by examining the overall theory, the core theory, the set of auxiliary assumptions, by performing some new experiments on the theory.

Consequently, it is now required to identify the problems, and resolve the issues regarding the core of materialism. This is necessary in order to achieve a more plausible doctrine.

Following this step, the set of the auxiliary assumptions of materialism and its forms have to be integrated into new thesis.[38] This modification is necessary but not sufficient to achieve the new thesis.

[38] In this step, assumptions have to be either modified or discarded. It is also possible that some of the assumptions can be used directly.

CHAPTER 5

A CASE STUDY

The criticisms of the forms of materialism show that they cannot give a satisfactory understanding of the mind and its working principles. Although they all have some important insight on the subject at some point or other they generally fail to fulfill their claims about the mind. In order to understand where and how these forms of materialism fail, a further consideration of a specific subject about the mind should be given, and it can reveal more about how a successful version of materialism can be constructed. For this reason, I have the following case. This case is designed to show a specific situation where all forms of materialism will fail to grasp the working of the mind. Moreover, it can also be used to show that what I call the methodological approach to the mind can handle the situation. This approach is also a modified version of physicalism, which will be explained below.

The experiment mainly depends on the assumption that the operation of the mind can be explained much more correctly by quantum mechanics; for the universe is governed by quantum physical laws. It is the fact that while the Newtonian physics can handle the macro sized objects in the universe perfectly well, it fails to explain and predict the behaviors of objects that do not fall under macro size. At the level of micro sized objects quantum physics seems to have been capable of explaining certain phenomena where the classical physics cannot. Therefore, this case is to be able to show that some quantum physical propositions are involved in some stage of the mind's operation. To see the presence some quantum states in the mind, there must be some non-physical entities - non-physical in the sense as the Newtonian

physics defines matter and physical objects- in the case. This is required because it is important in this experiment to show that there are entities in the universe, which obey the laws of modern physics, but are not physical in the classical sense. Moreover, classical materialism fails in dealing successfully with such objects; for it could not consider non-physical objects, which obeys the laws of modern physics. It is also important to point out that these entities (such as electro magnetic fields etc.) do not have any mystical features. They are just ontological entities in modern physics, which do not fit in to the definition of matter given in the Newtonian physics. They, however, obey the laws of quantum physics. Therefore, they have no magical properties that are over and above modern physics attributed to them.

For this case, there will be three different types of the construction of the mind, which involve quantum physical laws and entities are to be offered. The first proposal will be that in the operation of each individual neuron there are observable effects pointed out by quantum mechanics. The second proposal will be that the network of neurons is operating on the quantum level. In this part, behavior of a system of neurons will be observed, rather than one single neuron. The last proposal will cover the possibility that there may be a different construction of the mind, which involves not only neurons, but some additional ontological entities of quantum physics. The last proposal will include some aspects of Multiple Realization; because it assumes that the mind can be constructed with different elements, and can still carry out the same operations. As a result, there will be three different cases of the mind proposed.

Before going to discuss the above three cases, I will give a brief overview of the methodological physicalist attitude that I shall make use of in dealing with these cases. The methodological physicalism has two important aspects. First, it uses a methodological approach in understanding the working principles of the mind. It also tries to explain the universe by using the methodologies of sciences rather than making unsupported claims. The methodological approach is very similar to the methodological naturalist attitude of Chomsky. It mainly maintains as follows: the modern science has proved to be very successful in its endeavors by using a

scientific methodology. Therefore, in many other fields of intellectual activities the primary aspect of any research must be this methodological approach to the subject at hand. This approach seems to be very fruitful, and enables a research program to achieve the best possible results.

While methodological naturalism sounds very reasonable there are various problems regarding naturalistic approach. These problems are the main reasons for why it is included naturalistic approach. To understand those problems of the naturalistic approach it is better to understand what naturalism is in the first place.

Any activity conducted to gain knowledge limiting itself to only natural or physical objects, is called naturalistic approach. The definition of naturalism, like materialism, is based on the definition of material. This is not a mere coincidence. It is very predictable because the two approaches try to achieve the same result, which is an understanding of the universe that does not include superficial, mystical objects. The inclusion of physical into the definition of naturalism, as in the case of materialism, is very desirable to achieve a scientific understanding of the universe. However, the definition of physical is dubious in the classical sense, creating a fundamental problem to these views. Therefore, the naturalistic approach tries not to include any notion of supernatural or non-physical entities into scientific theories, while explaining the nature of the universe. However, it fails to grasp any property related to quantum physical ontological entities.

The second problem of naturalism is the problem of induction. Popper says that naturalism is in fact an inductive theory of science. He says:

> A naturalistic methodology (sometimes called an 'inductive theory of science') has its value, no doubt. [...] I reject the naturalistic view: It is uncritical. Its upholders fail to notice that whenever they believe to have discovered a fact, they have only proposed a convention. Hence, the convention is liable to turn into a dogma. This criticism of the naturalistic view applies not only to its criterion of meaning, but also to its idea of science, and consequently to its idea of scientific method.[39]

Popper continues by proposing that the important aspect is being falsifiable, rather

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[39] Popper 2002, p 31.

then naturalism. It is important that there must be a counterexample to a theory or to a law of the theory, which can be logically constructed. This of course does not mean that every law has to be shown to be false. It is a logical property of the law of the theory for which a counterexample is logically possible.

These two problems, which have been discussed above, make the naturalistic approach not a very promising one to adapt in methodological physicalism. Thus, the only part I will use is its methodological approach.

However, methodological approach by itself does not mean anything. Therefore, it is important to have some theory that will employ it. In this case, I will use a slightly modified version of physicalism. As a result, the main approach to the above cases will be called methodological physicalism. However, using the physicalism without making some changes to its definition will be useless because the status of modern physics.

Physicalism claims that everything in the universe is physical. On the other hand, it is now known that there are non-physical entities - in the sense that physical is defined by the classical physics - which obeys the physical laws such as electromagnetic fields. These are the kinds of entities, which cause materialism and physicalism to have serious problems. The case of physicalism is very similar to classical materialism as I pointed out earlier. Classical materialism claims that everything in the universe is material. However, it is not the case that everything is material. For this reason, if I want to use physicalism it is necessary to change its definition. Therefore, to make physicalism's definition viable again the change I propose is not to use physical objects in the classical sense, but to use objects that obey the physical laws. As a result, I lay down the main claim of physicalism as follows; everything in the universe has to obey the physical laws of the modern or any future physics. With this modified definition, physicalism can handle phenomena like electro magnetic fields and so on. Therefore, it does not rule out them as the old definition does.

When the definition of physicalism and methodological approach are combined, the result can handle some of very important aspects of the mind and the

universe where classical materialism fails to do so. I will show that this is in fact the case with the following three cases that were briefly outlined above.

Part 1: Quantum states at individual neurons

Part 2: Quantum states at networks of neurons

Part 3: A possible construction of mind only consisting of quantum physical specific entities.

5.1 Part 1: Quantum states at individual neurons.

For this case, I will assume that the mind and the brain are not separated from each other. This is of course one of the main claims of materialism that there is nothing except material going on in the mind. This is to say that there are no mental states in the mind. Everything that happens in the mind are material states and therefore the mind only consists of material states that are interacting with each other. There are no mental states whatsoever and there is no need for any interaction between mental and physical states because there are not mental states in the first place.

For the first case, I will assume that these physical states are the states of the individual neurons. Therefore, it is important to argue that these states of the neurons are purely physical or more precisely these states are biochemical. From another point of view, this is saying that there are no mental events occurring on a neuron. To be able to understand how there can be a possibility of quantum states on individual neurons it is first required to see how one neuron works. For this reason, Max Tegmark[40] defines a subsystem, which is a neuron in this case. He continues by saying that there are four important aspects of this subsystem. These are fluctuation, dissipation, communication and decoherence.[41] The first two are defined as the energy flow between the subsystems for example between two individual neurons and the last two are as the exchange of information between the subsystems. Tegmark also adds that the first three are to occur in the classical physics. Therefore,

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[40] Tegmark 1999, p 4196.

[41] For further reading on the theory of decoherence see Namiki 1997 “Decoherence and Quantum Measurement”.

for the sake of my argument they do not need to be explored more. On the other hand, decoherence is a quantum mechanical phenomenon, and therefore it is an important aspect of the subsystems for this part of the case study.

The theory of decoherence in quantum mechanics is the theory that tries to explain interactions between a subsystem and its environment. Decoherence studies the change of states in an environment by the subsystem rather than the change of states in the subsystem when they do interact of course. Decoherence is important in this argument because the theory of decoherence is believed to be capable of explaining whether the classical physics (and thus the "classical world") may emerge from a quantum mechanical state or not. Therefore, by using the theory of decoherence it is possible to show with this case if the mind and brain in fact appears to be on (involve any) a quantum mechanical state. Because if the classical physics cannot handle quantum mechanical states then it can be concluded that the mind can be explained better by using quantum mechanics.

To be able show that there is a quantum mechanical state involved in the working of a single neuron it is required that the decoherence rates of a single neuron must fall in to a certain ratio to dissipation times of the same subsystem. If this is the case, it can safely be stated that there are indeed quantum mechanical states involved in the given subsystem, in this case, a single neuron. In his experiment Tegmark calculated the decoherence times of neurons while they are firing. He found that the decoherence times of neurons were so small that they were not able to effect the environment.[42] Moreover, the ratio between the dissipation time and decoherence time of a neuron does not satisfy the requirement that is necessary to produce any quantum mechanical effect on the environment. Therefore, he concluded that there is no possibility of a quantum mechanical effect on the mind.[43]

While his experiment is valuable to show that there is no quantum mechanical effect on a single neuron, I think that his conclusion, that there is no quantum

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[42] Tegmark 1999 , p 4199.
[43] Tegmark 1999, p 4120.

mechanical effect in the brain, is too hasty. A better interpretation of the results of his experiments will lead to the possibility of finding some quantum mechanical effects involved in the networks of neurons rather than a single neuron. Because it maybe the case that, quantum mechanical effect in a single neuron subsystem does not emerge. However, this does not mean that such effects do not emerge in the networks of neurons. So, not observing quantum mechanical effects on a single neuron subsystem cannot lead to the conclusion that there will not be any quantum mechanical effects on the overall system. I will now continue with the second case, which is, considering there is a quantum mechanical effect on neural networks.

5.2 Part 2: Quantum states at networks of neurons

In the above case, it is shown that in a single neuron subsystem quantum mechanical effects do not arise. It maybe because they are simply too “macro” sized objects to carry any quantum mechanical states. As a result, single neuron operations in the brain failed to show any presence of quantum mechanical properties. Therefore, the next step in search for quantum mechanical effects in the brain will be considering what the properties of the neural networks are.

There are two important reasons behind this choice of neural network. The first one is that a single neuron fails to show any quantum mechanical property so it cannot be possible to establish the claim that the core point of classical materialism is at fault. The second reason is that neural networks create electromagnetic fields. These types of fields are explained much better by using quantum mechanics. In fact, they can be considered as ontological entities that belong to quantum mechanics because the classical physics fails to explain them as well as quantum mechanics. To put simply electromagnetic fields are not physical in the classical sense but they perfectly obey the law of modern physics. This is something that the classical physic fails to explain.

There are various points to consider in the case of electromagnetic fields that are generated by the networks of neurons. These are the effects of the networks of the neurons first on the behavior of other networks of neurons in the brain, and second on the behavior of a single neuron; namely on the firing of a single neuron.

To understand these issues it is required to understand the electromagnetic field of the brain in the first place. At the initial step, brain's electromagnetic field is generated by every single neuron. McFadden states that "The brain's endogenous em (electromagnetic) field is a product of the induced fields from neuron firing and also the fields generated by the movement of ions into and out of cells and with in extra cellular space".[44] Every single neuron creates some electromagnetic field due to its firing. Even a single neuron firing can create disturbances in the overall electromagnetic field of the brain. Therefore, the firing of multiple neurons, as in the case of networks of neurons, also disturbs the overall electromagnetic field of the brain. The disturbance created by the networks of neurons are obviously in much larger scale compared to a disturbance which is created by a single neuron firing.

The EEG experiments[45] showed that the networks of neurons create some peak points in the electromagnetic field of the brain due to their strength, and thus these can cause neuron firing. McFadden states that "The field may induce electrophoretic redistribution of charged ions both intracellularly and extracellularly and thereby directly modulate neuronal physiology" (McFadden page 27) Moreover, it is also shown that there can be multiple peak points in the electromagnetic field of the brain because multiple networks of neurons disturb the electromagnetic field of the brain at the same time. These multiple peak points sometimes strengthen each other and sometimes they eliminate each other. Therefore it is clear that there is some interaction between different multiple networks of neurons in the brain as they are communicating with each other. It is also the case that two neurons without any physical connection -in the classical sense- can communicate trough electromagnetic fields. McFadden states this phenomenon as follows: "There is considerable evidence that neurons do indeed communicate through the em field (known as field coupling). Ephatic nerve transmission describes the phenomenon whereby neuron firing is modulated by firing of adjacent neurons and has been demonstrated in vitro when

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[44] McFadden 2002, p 25.
[45] Jeffereys 1981, p 149.

neurons are brought into very close proximity under conditions that exclude synaptic transmission".[46] About ephatic nerve transmission, Buzsaki et al conclude, after a series of experiments conducted on hippocampus, which "Synchronization of pyramidal cells in the absence of excitatory collaterals may be brought by ephatic effects".[47]

Moreover, Jeffereys in his experiments concluded, "Extra cellular currents applied perpendicular to the granule cell layer in hippocampal slices altered the excitability of these cells. The evidence presented suggests this was due to modification of the membrane potential at a spike trigger zone in the vicinity of the cell bodies by the fraction of current which flowed intracellularly".[48] While Jefferys showed that neurons can fire because of disturbances in electromagnetic fields, Buzsaki also shows that it can happen even in exclusion of synaptic transmission.[49] Because of this, it is certainly the case that a electromagnetic field is affecting the brain in the sense that quantum mechanics define the theory.

It is clear that there are many problems of the classical electromagnetic theory such as it cannot handle small-scale electromagnetic field behaviors regarding in very small time scales.[50] Quantum mechanical electromagnetic theory is more reliable in understanding some certain phenomena. However, the differences between the classical electromagnetic theory and the electromagnetic theory defined by quantum physics are beyond the scope of my current study. So one, who needs further further detailed information on the subject, should read Feynman[51] and Bohm[52].

The electromagnetic field in the brain is created by two difference sources. The first one is the firing of each individual neuron, and the second one is the flow of

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[46] McFadden 2002, p 30.
[47] Buzsaki 1992. p 1021.
[48] Jefferys 1982, p 149.
[49] Further reading ephatic nerve transmission is by Konnerth 1986, Richardson 1984, Snow 1984.
[50] Feynman R. P, 1949 p 769 -770.
[51] Feyman 1961. *"Quantum Electrodynamics"*.
[52] Bohm 1951, *"Quantum Theory"*.

ions in and out of the cells. However, as McFadden[53] states, it is much more useful to consider single neuron firing as the source of electromagnetic field; because the peak voltage of single neuron firing is stronger than any other source of electromagnetic field in the brain. Thus, an electromagnetic field in the brain is mostly generated by the firing of single neurons (influences of subsystem on the environment) and also a electromagnetic field in the brain can change the firing patterns of an individual neuron by creating the necessary peak voltage (influence of the environment on the subsystem). It is the case that electromagnetic field can cause a neuron firing. Moreover, the firing of a neuron can cause peak voltages in the electromagnetic field. It is, unlike the above case of a single neuron system, possible that decoherence works in the brain when there is the involvement of an electromagnetic field.

This second case seems to correspond better to how the mind works. The brain now can be considered a system of networks of neurons and the electromagnetic fields that are created by those networks. Probably the most crucial thing is the interaction to and effect of the networks of neurons on electromagnetic field, and electromagnetic field's effect on a single neuron and network of neurons. Moreover, the information exchange in the brain has two distinct ways. The first way is by the firing of neurons, which is digital data. It is the case that a neuron either fires or not. There is no other state that a neuron can be in for information exchange. The second way is through electromagnetic fields in the brain. Those data, unlike the neurons case, is analog. It is the strength of the electromagnetic field that carries out the information exchange process. McFadden in his later paper[54] claims that consciousness also emerges from electromagnetic fields in the brain.

Assuming that the mind works in this sense (via networks of neurons and electromagnetic fields), let us try to see how classical materialism and methodological physicalism cope with this proposal of the mind. classical

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[53] McFadden 2002, p 25.
[54] McFaaden 2002 (a), p 46.

materialism in this case, by claiming that everything is physical, can perfectly handle the working principle of neurons and the information exchange between single neuron. This is because as it is shown in the first case there are no quantum mechanical effects during the firing of a neuron. Note that, it is only the process during firing not the effects that cause the neuron to fire. Therefore, the classical physics and thus classical materialism has no problems with explaining a single neuron firing process. On the other hand, materialism fails to grasp the properties of electromagnetic fields. It fails to explain how information exchange is carried out through and how they affect other neurons firing patterns. Thus, classical materialism can only explain one source of information exchange and processing system of the mind. That is carried out by neurons. This seems to be the most important problem of classical materialism and the reason why it cannot be a viable solution to understand how the mind works.

On the other hand, the methodological physicalism can explain these two aspects involving information exchange and processing. The first aspect is a single neuron firing. As it is shown earlier, classical physics can explain the working principles of a single neuron. Therefore, there is no reason that the modified physicalism can fail to do so. The important thing, however, in this argument is if it can explain the second aspect, the one including the electromagnetic fields. The physicalism that I use claims that it is not important for an ontological entity to be physical as it is defined in the classical physics. What is important is that those ontological entities obey the laws of modern physics; namely, the quantum mechanical laws. Therefore, in the case of electromagnetic fields the physicalism I use can explain how electromagnetic fields affect each other and other neurons by employing quantum mechanical laws regarding electromagnetic fields. This is exactly where classical materialism fails.

5.3 Part 3: Possible mind only consisting of quantum physical specific entities.

The last case is a hypothetical construction of the mind, where there are quantum mechanical ontological entities, which are an integral part of the

construction. The reason behind this idea is to show the possibility that there can be "artificial quantum neural networks" which have the possibility of mimicking the mind precisely.

These artificial quantum neural networks are similar to connectionist models of the mind. The connectionist models of the mind[55] only simulate the connections and interactions between neurons. Thus, from the above arguments of electromagnetic fields it can be concluded that these connectionist models of the mind are not covering the complete structure of the mind. Therefore, what is required to improve the connectionist models of the mind is to integrate the quantum mechanical properties of the electromagnetic fields in to the existing models. Therefore, to understand these "artificial quantum neural networks", classical materialism will not be sufficient enough because of the reason that classical materialism fails to grasp most of the phenomena that include some quantum mechanical properties in it. Artificial quantum neural networks can be the best possible solution in making a model of the mind and the methodological physicalism can explain these networks where classical materialism fails. Thus, it can be considered a better replacement for classical materialism.

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[55] For further discussion on connectionist models, see Fodor J. A, 1987.

CHAPTER 6

CONCLUSION

This chapter gives a complete overview of the issues discussed in this research study about classical materialism concerning the working principles of the mind. It has been discussed how classical materialism and its forms cannot be reliable because of the fact that they do not take into account modern physics. This is also the reason why the methodological physicalism is a better approach to study of the mind. It is also gives a further discussion of the cases concerning the mind that are given in the last chapter, and finally the possibility of future work on methodological physicalism.

6.1 Why does classical materialism fail?

In the first chapter the definition of classical materialism and its forms were given. Classical materialism claims that everything in the universe is material, and that there is nothing over and above the material. In this case, classical materialism claims that there are no “mental events”. In fact, this is a very straightforward axiom of the doctrine. It can handle many situations under the classical physics as the working principles of macro-sized objects in the universe where no quantum effect can be observed.

There are, however, two core problems regarding classical materialism at this point. The first one is the effects of quantum mechanical states on a give system. The second one is that the definition of classical materialism is no longer a sound definition after the abolishment of the classical physics. Therefore, if there is a system, such as the mind, where the effects of quantum mechanical

states might be involved in the operation of that system then classical materialism cannot be in a position to be able to handle the working principles of such a system. Moreover, the definition of matter that is used to define classical materialism is no longer tenable. Therefore, the definition of classical materialism is itself not tenable also. These are the two main reasons why classical materialism fails and it is better to use some other doctrine, which can fill the gaps where classical materialism cannot explain. Overall, to overcome the above problems a new theory has to be introduced that can explain the mind, and avoid the pitfalls of classical materialism.

6.2. Why do the three forms of classical materialism fail?

6.2.1 Reductive materialism

Reductive materialism claims that folk theoretic claims about the mind can be reduced to those of a neuroscience. As it is stated earlier in this study, there are two important fundamental problems of reductive materialism. These are the problems with reduction itself regardless of the subject, and the problems with reductive materialism itself, specific to folk psychology and neuroscience.

In the case of reductive materialism, folk psychology and neuroscience together cannot satisfy the necessary conditions for a reduction between these two theories. Therefore, talking about reducing folk psychology to a neuroscience is not possible. Thus, reductive materialism fails because of the problems of materialism itself and more importantly, there are no grounds for reduction in this case.

6.2.2Eliminative Materialism

Eliminative materialism claims that folk psychology is fundamentally wrong and it has to be eliminated as an available theory for our understanding the mind. Instead, a superior-neuroscience has to be used to understand the mind. The proposed aim of the both reductive materialism and eliminativism is the following: a more scientific explanation of the mind. However, while trying to achieve this, eliminative materialism overlooks the point that folk psychology is not a theory. Thus, claiming that it is fundamentally wrong makes the claims of

eliminative materialism weaker.

Folk psychology consists of everyday observations of people about the mind. Therefore, there is some degree of truth in it. Moreover, for nonprofessionals it works perfectly well in trying to understand the mind. The case is very similar to folk physics versus modern physics. In the case of physics, physicists do not see any need to eliminate folk physics. In the case of physics, folk physics and modern physics coexist together. Because it serves well for many. Thus, in the case of folk psychology, there is no need to eliminate it. However, more important thing to be focused on is aiming at the construction of a superior-neuroscience.

6.2.3Functional Materialism

Functionalism claims that mental states and properties are functional states of the mind. Moreover, functionalism claims that mind can be replaced by some information processing system. Thus, it is maintaining that consciousness and every other aspect of the mind can be explained as being some forms of computation. Functionalism indicates that the states of the mind can be reduced to some states of computation. Therefore, it is clear that functional materialism commits itself to the idea of reduction and reductive materialism.

Thus, it can be concluded that functional materialism fails because of the similar reasons for why reductive materialism failed. Moreover, functional materialism can account for the mind if the system is in the state that only the neurons and their connections are the source of operation in the mind. However, as it is discussed in the case study, this is not the case. In the brain, the functions are carried out by neurons (as their states and so on). In addition, the electromagnetic field causes disturbances in their functionality. Thus, the overall system is a collection of functions of neurons, and the effects of electromagnetic fields on these neurons. Consequently, functionalism fails to cover the overall system of the mind.

6.3 Proposed cases of the mind

In the above chapters, it is shown that classical materialism and its forms

cannot be used anymore to explain the mind because of the involvement of the same quantum mechanical states in the brain. It is then required to construct a new approach, which can explain the mind better than classical materialism and its forms. There are three different cases of the mind proposed in the case study chapter. These cases (except the first one) cannot be explained by classical materialism and its forms because of the involvement of some quantum mechanical states. These cases are constructed in such a fashion that the classical views about the mind obviously fail to capture some of the principles of the mind.

Moreover, it is not the case that quantum mechanics is perfect and the ultimate physics. However, it can still account of these cases better than the classical physics. It is just the case that the quantum physics is in such a state that it can make better sense of some aspects of the above cases of the mind than the classical physics. Quantum physics is used to explain the cases of the mind not because it is the ultimate physics, but it is used because these are the same quantum mechanical states involved. This distinction is very important for the following reason. By using the quantum mechanics, we can handle the cases of the mind better than the classical physics. However, we are not committing ourselves to the truth of quantum mechanics. Quantum mechanics is used because it can explain the mind better than the classical physics. Therefore, the methodological physicalism commits itself to the best possible explanation with the help of modern physics. This property of the methodological physicalism enables it to adapt itself to changes in physics as it may occur at any given time in the future.

6.3.1 Single Neuron System Case of the Mind

This case of the mind is that the mind operates on the level of single neuron firing only. This case also contains that information exchange in the brain is carried out only by firing of an individual neuron and nothing else. In the experiments done by Tegmark, he shows that quantum physical properties do not emerge in this case of a single neuron system. Tegmark thus concludes that there is no quantum effect in the brain. However, he fails to observe the overall system

of neurons where in fact the quantum effects are observable. In the methodological physicalism, it is aimed at explaining the working of the complete system. Thus, we can observe the quantum effects. Moreover, not observing quantum effects on a single neuron cannot prove that there are no quantum effects at all. While he concludes that there cannot be quantum effects in the brain, I conclude that we have to look into different case of mind to observe some quantum effect in the brain.

6.3.2 The Case of Networks of Neurons in the Mind

This case of the mind, unlike a single neuron system, entails a network of neurons. There are two important aspects in this case. The first one is the effects of the networks of the neurons on a neuron, which is in the network. The second one is the effects of the networks of the neurons on neurons that reside in other networks of neurons. When the proposed system includes the network of neurons then an electromagnetic field created by those networks comes in to play. Because of this involvement of electromagnetic fields, it becomes possible to observe some quantum mechanical effects in the brain. This case of the mind seems to match the workings of it better than a single neuron case. It can handle the information exchange between distant neurons, which do not have any firing pattern connecting them. In this case, simply because of the presence of some quantum mechanical states quantum mechanics becomes a better physics to explain the phenomena compared to the classical physics. Thus, using quantum mechanical approach to the case at hand can reveal much more information regarding the working principles of the mind compared to the classical physics. This is the main reason why I choose to use quantum mechanics; it is not because I commit myself to quantum mechanics as the true theory. It is because quantum mechanics at this stage of the mind can explain it better than any other theory. Consequently, the methodological physicalism commits itself to a physics, which can give the best possible explanation of phenomena. Thus, in the future, if a hypothetical physics becomes more powerful in explaining this case of the mind, then methodological physicalism can adapt itself easily, without losing any explanatory power, to using

that physics instead of quantum physics.

6.3.3 An Artificial Quantum Neural Network Case of the Mind

This case of the mind is a suggested proposal that the mind can be simulated by constructing artificial neural networks, which can include quantum mechanical effects similar to the ones found in the brain. As in the case of the networks of the neurons this case can also be dealt better with by using quantum mechanical laws. This is because artificial quantum neural networks will employ quantum mechanical properties intrinsically. Thus, if we construct a case by employing quantum mechanics then there is no better tool to explain it other than quantum mechanics itself. This case of the mind can replace especially the connectionist models of the mind for the following reason: The connectionist models of the mind can only simulate the connections between the neurons and the behavior of the network that is created by these neurons and the connections between them. However, the artificial quantum neural networks will do exactly the same thing as the connectionist models do, and in addition, they can simulate the behavior of the electromagnetic fields that are created by the networks of neurons. Because of being able to simulate the networks and the electromagnetic fields, artificial quantum neural networks can be more revealing about the working principles of the mind than the connectionist models. This case will be constructed by simulating the system of the brain, and because the system in the brain, the networks of neurons and the electromagnetic fields, can be explained by quantum mechanics better than any other theory at hand. Thus, it is straightforward that quantum mechanics will be used in explaining and constructing the “artificial quantum neural networks”.

6.4 Directions for future research

Classical materialism and physicalism both have two important aims, which are, explaining the underlying structure of the universe and explaining the working principles of the mind. These views about the mind and the universe use the classical physics to support their claims. However, when the current physics is changed the definitions of the materialism and the physicalism became empty.

Because of all these reasons there is a need for a new approach, which can explain the mind better than the above two alternatives. Methodological physicalism can replace classical materialism and the rest because of the following reasons: first, the methodological physicalism has better tools, including scientific theories to explain the mind better than the others can. Second, the methodological physicalism can adapt itself to developments, and evolutions, which may take place in physics, and thus avoiding the mistakes of classical materialism. Moreover, the methodological physicalism does not use quantum physics because it is the ultimate physics. It employs quantum physics because quantum physics can deal with the issue involving some quantum mechanical states at hand. Thus, the methodological materialism never commits itself to the truth-value of a certain kind of physics, but rather uses the best available alternative. After constructing a view of the methodological physicalism, it has to be tested. In addition, it has to give more successful explanations of not only the mind but the universe is compared to classical materialism. As a result, it is possible to have a theory of the mind, which can adapt itself to the changes in the physical sciences thus, avoids becoming obsolete. This property of the theory can make it a very plausible theory of the mind because it will grow, adapt, and change according to the changes, which occur in physics, and it can lead the way to a more successful neuroscience. Thus, it can lead to a better understanding of the mind.

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