

## LA INCONSISTENCIA DEL NATURALISMO EN LA EXPLICACIÓN DE LA RELACIÓN ENTRE CIENCIA Y METAFÍSICA

The Inconsistency of Naturalism in Explaining the Relationship between Science and Metaphysics

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### RESUMEN

Los naturalistas no aceptan la metafísica como un conocimiento a priori, antes de la ciencia, y creen que no hay una ruta extracientífica para la comprensión metafísica. Desde este punto de vista, la ciencia, como estudio empírico, es anterior a la metafísica y el objetivo de los metafísicos de hacer metafísica está totalmente dentro de los límites de la ciencia contemporánea. En este documento, nuestro objetivo es mostrar que la posición del naturalista no es justificable. De hecho, ofrecemos dos argumentos que muestran que la posición del naturalista es contraproducente. También mostraremos que las teorías científicas, históricamente, no surgen de acuerdo con la posición del naturalista.

**PALABRAS CLAVE:** NATURALISMO CIENTIFICO, METAFISICA, CIENCIA, CIENTIFICISMO.

### ABSTRACT

Naturalists don't accept metaphysics as *ana priori* knowledge, prior to science, and believe that there is no extrascientific route to metaphysical understanding. In this view, science, as an empirical study, is prior to metaphysics and metaphysicians' aim to do metaphysics is wholly within the bounds of contemporary science. In this paper, we aim to show that naturalist's position is not justifiable. In fact, we offer two arguments that show naturalist's position is self-defeating. We shall also show that scientific theories, historically, don't arise according to naturalist's position.

**KEYWORDS:** SCIENTIFIC NATURALIS, METAPHYSICS, SCIENCE, SCIENTISM.

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## 1. Introduction

Historically, some of the most significant debates in metaphysics have concerned the nature of universals, substance, causation, laws of nature, modality, identity, time, and truth. There can be metaphysical issues in all other areas of philosophy. For instance, the mind–body problem is a metaphysical issue in the philosophy of mind<sup>1</sup>. In metaphysics, we deal with questions about the nature of the universe, the nature of human beings, and the nature of the relationship between them: What does it mean to say that something exists? What does necessity and possibility mean? Does reality have a beginning and an end? What are space and time? Does reality have a creator? Is there a single unified order or reality is partitioned into multiple realms that never interact? What does causation mean? Is there a necessary connection between the cause and its effect? And so on.

Given that both metaphysics and science seem to seek a description of the nature and the workings of the world, we can ask the question of how they differ. Furthermore, assuming that we can find some differences between them, we can then ask about how they relate. Is one discipline above the other one in any respect? Is either of them logically or epistemologically prior to the other? Philosophers of science and metaphysicians have had different views on these questions and there has been substantial disagreement among them. In the spectrum of the available views, we find at one extreme the view that metaphysics is meaningless and nonsense and at the other extreme the view that all empirical and scientific knowledge is dependent on prior metaphysical understanding<sup>2</sup>.

Recent decades have witnessed a flurry of philosophical activity in the name of naturalism. Most contemporary philosophers identify themselves as naturalist, and much recent work in philosophy can be seen as part of general trend toward conducting philosophical inquiry under the umbrella of naturalistic assumptions<sup>3</sup>. The tie between naturalism and the modern sciences of nature is quite close. The extraordinary achievements of the latter have become one of the principal arguments

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<sup>1</sup> MUMFORD, S., "Metaphysics", M.Curd and S.Psillos (eds.), *The Routledge Companion to Philosophy of Science*, Routledge, Routledge, 2008, p. 26

<sup>2</sup> Ibid., p. 26

<sup>3</sup> REA, M., *World without Design: The Ontological Consequences of Naturalism*, New York, Oxford, 2002, p. 21

in favour of the former<sup>1</sup>. Therefore, considering the close relation of naturalism with science, naturalist's answer to the above questions (the relation between science and metaphysics) is important. In this paper we intend to analyse and criticize naturalist's position about metaphysics and its relation with science. In section two, we "define" scientific naturalism and its essential characters. In section three, we examine the position of naturalists about metaphysics and its relation to science. In section four, we argue that naturalist's position is self-defeating and that scientific theories, in practice, don't arise according to naturalist's position.

## 2. Scientific Naturalism

The term "scientific naturalism" is the invention of Thomas H. Huxley (1825-95). He used it to describe a philosophical outlook that shunned the supernatural and adopted empirical science as the only reliable basis of knowledge about the physical, social, and moral worlds<sup>2</sup>. Today the label "naturalism" refers to a worldview. According to Jaegwon Kim, if current philosophy can be said to have a philosophical ideology, it is, unquestionably, naturalism<sup>3</sup>. Georg Gasser claims that naturalism is not only the most accepted creed among analytic philosophers but a wide-spread worldview throughout contemporary intellectual culture<sup>4</sup>. Nevertheless, naturalism is not a clearly defined philosophical position. According to David Papineau, its current usage derives from debates in America in the first half of the last century<sup>5</sup>. The self-proclaimed "naturalists" from that period included John Dewey, Ernest Nagel, Sidney Hook and Roy Wood Sellars. These philosophers aimed to ally philosophy more closely with science. They urged that reality is exhausted by nature, containing nothing supernatural, and that the scientific method should be used to investigate all areas of reality.

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<sup>1</sup>MCMULLIN, E., "Varieties of Methodological Naturalism", B. L. Gordon and W.A. Dembski (eds.), *The Nature of Nature*, New York, ISI Books, 2011, p. 82

<sup>2</sup>NUMBERS, R. L., "Science without God: Natural Laws and Christian Beliefs", B. L. Gordon and W. A. Dembski (eds.), *The Nature of Nature*, New York, ISI Books, 2011, p. 62

<sup>3</sup>KIM, J., "The American Origins of Philosophical Naturalism", *Journal of Philosophical Research* 28 (2003), p. 84

<sup>4</sup>GASSER, G., "Introduction", G. Gasser (ed.), *How Successful Naturalism?* New York, Ontos-Verlag, 2007, p. 3

<sup>5</sup>PAPINEAU, D., "Naturalism", Edwar Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, 2007, <http://plato.stanford.edu/entries/naturalism>.

What are the essential characteristics of scientific naturalism? There are two basic, but general, characteristics that seem to shape the heart of naturalism: (1) scientism, and (2) avoiding supernatural. This can be related to the place of naturalism and its effect on philosophical circles with the quick development of science. The naturalistic approach is always accompanied with faithfulness to science. The central role of natural science for naturalists causes many naturalists to consider such role as the base of naturalistic approach. John Haught considers scientism as "the epistemic soul of scientific naturalism"<sup>1</sup>. Peter Forrest considers naturalism to be a set of strategies to understand the world. Central to this set of strategies is to analyze and present the world by relying heavily on science<sup>2</sup>. Hence, naturalists consider science as the primary source of reliable knowledge about reality. Science, according to naturalism, has shown to be the most successful strategy for understanding the structure of our world and its causal interactions<sup>3</sup>.

The second character of naturalism is to avoid supernatural. Naturalism, particularly in the current century, is defined in opposition to supernaturalism. This opposition is at the heart of most definitions and arguments related to naturalism. Therefore, whereas in the past centuries, "naturalist" was used in the sense of "a student of the natural world", now it is used in the sense of "avoiding supernatural"<sup>4</sup>. John Haught, points out that today naturalism is a worldview, and that:

In fact, many scientific naturalists are now avowed atheists, although some prefer to be called agnostics. Scientific naturalists, in any case, question whether complete understanding of the world requires reference to a creator or divine action. It seems more likely to them that nature is its own originator and that natural process is the sole author of life and mind as well<sup>5</sup>.

Following this approach, some naturalists consider materialism and positivism as the most important kinds of naturalism. Armstrong's sentence, that is repeated by naturalists frequently, is indicative of this naturalistic approach:

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<sup>1</sup> HAUGHT, J., *Is Nature Enough? Meaning and Truth in the Age of Science*, Cambridge, Cambridge University Press, 2006, p. 4

<sup>2</sup> FORREST, P., *God without the Supernatural: A Defense of Scientific Theism*, New York, Cornell University Press, 1996, p. 89

<sup>3</sup> GASSER, G. and MATHIAS, S., "The Heavy Burden of Proof for Ontological Naturalism", G. Gasser (ed.), *How Successful Naturalism?* New York, Ontos-Verlag, 2007, p. 159

<sup>4</sup> DAWKINS, R., *The God Delusion*, London, Bantam Press, 2006, pp. 13-14

<sup>5</sup> HAUGHT, *Ibid.*, p. 5

Naturalism, I define as the view that nothing else exists except the single, spatio-temporal world, the world studied by physics, chemistry, cosmology, and so on<sup>1</sup>.

### 3. Scientific naturalism and metaphysics

Naturalists don't accept metaphysics as an *a priori* knowledge, prior to science. Theology or other kinds of knowledge, considered prior to science or regarded as a framework for scientific knowledge. In naturalism's view, natural science enjoys an epistemic authority, and any knowledge beyond it cannot be taken as the basis of science. In fact, naturalists claim that philosophical theorizing is a kind of practical extension of science. In Quine's words:

Naturalism is the abandonment of the goal of a first philosophy prior to natural science... and it is the recognition that it is within science itself, and not in some *a priori* philosophy, that reality is to be identified and described<sup>2</sup>.

Kornblith describes naturalism as:

In metaphysics, I believe, we should take our cue from the best available scientific theories. As Wilfrid Sellars so nicely put it, "science is the measure of all things, of what is that it is and of what is not that it is not" . Current scientific theories are rich in their metaphysical implications. The task of the naturalistic metaphysician, as I see it, is simply to draw out the metaphysical implications of contemporary science. A metaphysics which goes beyond the commitments of science is simply unsupported by the best evidence... For the naturalist, there simply is not extra-scientific route to metaphysical understanding<sup>3</sup>.

John Hampton too believes that naturalism is the view that philosophy –and indeed any other intellectual discipline- must pursue knowledge via empirical methods exemplified by the sciences, and not by *a priori* or non-empirical methods<sup>4</sup>. Alvin Goldman considers a kind of naturalism called "Radical Epistemological Naturalism". From the perspective of this kind of naturalism, epistemological statements are a

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<sup>1</sup>ARMSTRONG, D., *What is a Law of Nature?* Cambridge, Cambridge University Press, 1983, p. 82

<sup>2</sup>QUINE, W.V., *Theories and Things*, Cambridge, Belknap Press of Harvard University, 1981, p. 21, 66

<sup>3</sup>KORNBLITH, H., "Naturalism: Both Metaphysical and Epistemological", *Midwest Studies in Philosophy* 19 (1994), p. 40

<sup>4</sup>HAMPTON, J., *The Authority of Reason*, Cambridge, Cambridge University Press, 1998, p. 20

subset of the statements of science, and the proper method of doing epistemology is the empirical method of science<sup>1</sup>. In fact, in Goldman's view, epistemology which sometimes provided the background and the base of empirical knowledge, is now, in the naturalistic approach, a part of empirical science. Following this, other branches of philosophy have such position. Therefore, in naturalist's outlook we have no knowledge prior to empirical science, and we even don't have any other kind of knowledge at the same level.

Thus, according to naturalists, metaphysics is a branch or extension of empirical knowledge, and the way that it differs from science is not by the virtue of being *a priori* but by the virtue of being more abstract. In this view, metaphysics might still be possible, though now it is understood as a kind of *a posteriori* knowledge only. The division between science and metaphysics is not on the basis that one is empirical and the other is *a priori*. Then, where would the division line? An option is to think of types of study falling on the spectrum of being more-or-less concrete or abstract. Metaphysics, would be continuous with physics but more abstract<sup>2</sup>. Metaphysics is, then, as *a posteriori* as anything else, but is distinguished by being at the more abstract end of the *a posteriori*. In this view, science, as empirical study, is prior to metaphysics and metaphysicians' aim to do metaphysics would wholly fall within the bounds of contemporary science.

#### 4. Arguments against naturalist's position

In this section we shall examine the validity of naturalist's position about metaphysics. It seems that naturalist's position about metaphysics and its relation to science is justifiable if it satisfies the following two conditions:

- (1) It has coherence, i.e. it is not self-defeating.
- (2) Scientific theories are practically made in accordance with naturalist's position or they have such a purpose (we call such argument an *a posteriori* argument).

We shall show that the naturalist's position doesn't satisfy the two aforementioned conditions, and thus it is not justifiable.

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<sup>1</sup>GOLDMAN, A., "A Priori Warrant and Naturalistic Epistemology", *Philosophical Perspectives*, Vol. 13 (1999), p. 2

<sup>2</sup>MUMFORD, *ibid.*, p. 33



## 4.1 Self-defeated arguments of naturalist's position

### 4.1.1 First Argument (Rosenberg's Argument)

Alex Rosenberg argues that naturalism leaves us with a major unsolved problem<sup>1</sup>. Without recourse to a "first philosophy", naturalism can only appeal to the sciences themselves to understand the inference rules, methods of reasoning, methodologies of inquiry, and principles of epistemology which will distinguish between those conclusions justified by evidence and those not justified by it. Now, suppose one asks about the justification of a principle of logic or a methodology used to justify the conclusions of science. Naturalists have two ways to answer:

- 1- Appealing to a "first philosophy", as an epistemology prior to and more secure than science. But according to naturalists, this is out of question.
- 2- Appealing to science or its success to ground its rules.

According to naturalists, science cannot be justified by anything outside of science, and there are no transcendental theories challenging it. Science can only be challenged by itself. According to Kornblith, what does have priority over both metaphysics and epistemology, from a naturalistic perspective, is a successful scientific theory; not because there is some *a priori* reason to trust science over philosophy, but because there is a body of scientific theory which has proven its value in prediction, explanation, and technological application. This gives scientific work a kind of grounding which no philosophical theory has so far enjoyed<sup>2</sup>.

The second way faces two fundamental challenges. The first was explained by Rosenberg and the second was explained by Micheal Rea:

- 1- Rosenberg argues that grounding rules on science's technological success would be to surrender naturalism to a first philosophy – called "pragmatism". Naturalism justifies epistemology, logic and methodology it recommends because these emerge from a successful science. In other words, naturalists are using some rules and methods to reach scientific conclusions, but, in their view, these rules and

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<sup>1</sup>ROSENBERG, A., *Philosophy of Science: A Contemporary introduction*, New York, Routledge, 2005, pp. 161-3

<sup>2</sup>KORNBLITH, *ibid.*, p. 49

methods are themselves justified on the basis of the success of science. Thus, Rosenberg concludes that Naturalism would be reasoning in a circle<sup>1</sup>. To appeal to the practical and technological success of science might solve naturalist's justification problem. But the result would no longer be naturalism. Science does in fact have a magnificent track record of technological applications, with practical and pragmatic successes. But why should this provide a justification for its claims to constitute knowledge, or its methods to count as an epistemology? It does so only if we erect an *a priori* first philosophy, such as pragmatism. This philosophy may have much to recommend it, but it is not naturalism, for it begins with a philosophical commitment prior to science, and may have to surrender those parts of science which are incompatible with it<sup>2</sup>.

2- Michael Rea argues that nobody believes that we have infinitely many sources of evidence, each being certified, as reliable, by sources at a higher level. Thus, naturalists and non-naturalists alike must believe that at least some sources of evidence are appropriately trusted, even in the absence of any evidence certifying their reliability. We might say, then, that at least some sources of evidence *stand in no need of justification*. But if we concede that we need no justification for believing that empirical methods issue in justified belief, still it is quite obvious that we *would* need some justification for believing that *only* empirical methods issue in justified belief<sup>3</sup>.

#### 4.1.2 Argument based on Methodological Naturalism (Second Argument)

In naturalist's view, scientific method is the only way to get access to reliable knowledge. This view is called "methodological naturalism". There are three forms of methodological naturalism as follows:

- 1- Positivist Methodological Naturalism (PMN): the *only* legitimate way to gain valid knowledge of the real is to follow the methodology of the natural sciences.

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<sup>1</sup>ROSENBERG, *ibid.*, p. 162

<sup>2</sup>*Ibid.*, p. 162

<sup>3</sup>REA, *ibid.*, pp. 61-64



- 2- Strong Methodological Naturalism (**SMN**): the *only* valid source of knowledge of the natural world is the natural sciences.
- 3- Weak Methodological Naturalism (**WMN**): The natural sciences are *sufficient* to understand nature

We can now ask this question to the naturalist: how do you justify one of the three forms of methodological naturalism? Three answers can be given to this question:

1- To appeal to metaphysics as an epistemology prior to science i.e. we consider PMN and SMN, as metaphysical presuppositions and WMN, as a pragmatic presupposition. This answer is not acceptable for naturalists, because they don't accept any knowledge prior to science.

2- To appeal to science or its success. This way faces the problem explained earlier (4.1.1 section) i.e. it finally leads to pragmatism, which is a kind of metaphysical knowledge prior to science.

3- Sometimes naturalists consider methodological naturalism as a basis for access to reliable knowledge without a question asked for its justification. This view is a naturalistic dogma, and by itself doesn't justify naturalist's position. As Popper said:

“Experience” for him is a programme, not a problem...what I call “methodology” should not be taken for an empirical science. I do not believe that it is possible to decide, by using the methods of an empirical science... Thus I reject the naturalistic view. It is uncritical. Its upholders fail to notice that whenever they believe themselves to have discovered a fact, they have only proposed a convention. Hence the convention is liable to turn into a dogma<sup>1</sup>.

So naturalists are not able to justify methodological naturalism which is the basis of their claim about metaphysics. Therefore, they can't justify their view about metaphysics.

## 4.2 A *Posteriori* Argument

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<sup>1</sup>POPPER, K., *The Logic of Scientific Discovery*, New York, Routledge, 2002, pp. 30-31

When we examine history of scientific theories, we find that metaphysics, as a knowledge prior to science, has an important role in the formation and development of scientific theories. As Donald Gillies said:

Metaphysical ideas are not only meaningful, but necessary for science. They provide an indispensable framework within which specific theories can be constructed and compared with experience. Metaphysics acts as a guide, or heuristic, for science<sup>1</sup>.

In order to falsify naturalist's claim, it is sufficient to indicate an example of a metaphysical idea within which scientific theories have been produced. Naturalist claims metaphysics produces and develops within the boundaries of science. On the contrary, we shall show that scientific theories (at least some of them) are produced within the boundaries of metaphysics.

The view that “nature is describable by mathematics and universe is a systematic, harmonious structure whose essence is mathematical laws, and science was to be patterned on the mathematical model” is a metaphysical idea. Copernicus, Kepler, Galilei and Newton, who are the founders of the new science, all of them were using this metaphysical idea in their scientific theorizing. While there were strong reasons against Heliocentrism in Copernicus' time (e.g. unable to explain stellar parallax, contrast with the common sense...), Copernicus and Kepler believed, based on the above metaphysical idea, that their mathematical model is true because it is simpler and more harmonious. Being faithful to this metaphysical idea, in spite of the empirical evidences which were opposite of it, wasn't easily acceptable for many empiricists of that period. For example Francis Bacon, the father of empirical science, believed that:

In the system of Copernicus there are found many and great inconveniences...all these are the speculations of one, who cares not what fictions he introduces into nature, provided his calculations answer<sup>2</sup>.

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<sup>1</sup> GILLIES, D., *Philosophy of Science in the Twentieth Century: Four Central Themes*, Oxford, Blackwell, 1993, p. 201

<sup>2</sup> KLINE, M., *Mathematics in western culture*, New York, Oxford University Press, 1953, pp. 116-117

His opposition to Copernicus' theory indicates the difference between metaphysics and empirical science in Bacon's view and the priority of empirical science in his view. Morris Kline believes that:

Modern science derived its inspiration and initiation from a philosophy that affirmed the mathematical design of nature. Moreover, the goal of science was, similarly, a mathematical one, namely, the disclosure of that design. As Randall says in *The Making of the Modern Mind*, science was born of a faith in the mathematical interpretation of Nature, held long before it had been empirically verified<sup>1</sup>.

Richard Westfall argues that two major themes dominated the scientific revolution of the 17<sup>th</sup> century: (1) the Platonic-Pythagorean tradition, which looked on nature in geometric terms, and was convinced that the cosmos was constructed according to the principles of mathematical order, and (2) the mechanical philosophy, which conceived of nature as a huge machine and sought to explain the hidden mechanisms behind phenomena<sup>2</sup>. The first theme is identical with the above metaphysical idea, on the basis of which scientific theories of 17<sup>th</sup> century were formed.

Nowadays mathematics is widely taken to play the role of a metaphysical background in scientific theorizing. Some of the most famous physicists such as Albert Einstein, Paul Dirac and Charles H. Townes have used the metaphysical ideas in scientific theorizing. As Paul Davies put it:

It is widely believed among scientists that beauty is a reliable guide to truth, and many advances in theoretical physics have been made by the theorist demanding mathematical elegance of a new theory. Sometimes, where laboratory tests are difficult, these aesthetic criteria are considered even more important than experiment<sup>3</sup>.

Einstein, for instance, when discussing an experimental test of his general theory of relativity, was once asked what he would do if the experiment didn't agree with his

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<sup>1</sup>Ibid., p. 108

<sup>2</sup>WESTFALL, R. S., *The construction of Modern Science: Mechanisms and Mechanics*, Cambridge, Cambridge University Press, 1977, p. 1

<sup>3</sup>DAVIES, P., *The Mind of God: The Scientific Basis for Rational World*, New York, Touchstone, 1992, p. 176

theory. He was unperturbed at the prospect, and said: "so much the worse for the experiment. The theory is right!" Also Paul Dirac, the theoretical physicist whose aesthetic deliberations led him to construct a mathematically elegant equation for the electron, which then led to the successful prediction of the existence of antimatter, echoed his sentiments when he said that "it is more important to have beauty in one's equations than to have them fit experiment"<sup>1</sup>. Townes, who shared the 1964 *Nobel Prize for Physics* for his work that led to the development of the laser, believes that:

We scientists, seeing a simple relationship that seems beautiful, intuitively think it likely to be true<sup>2</sup>.

Heisenberg argued that when nature leads us, by way of scientific analysis, to simple and beautiful mathematical forms, we are irresistibly impressed by the feeling that these forms must be "true"; that they must in fact reveal an actual feature of the natural world<sup>3</sup>. So it seems that the metaphysics affects not only the tendency of scientific studies, but also it supplies a framework for science. Ignoring these metaphysical commitments can lead scientists to make mistakes. As Schrodinger said:

Metaphysics does not form part of the house of knowledge but is the scaffolding without which further construction is impossible<sup>4</sup>.

On the one hand, the metaphysical insight (that acts as a framework for science) helps scientists to see all areas of science and avoid naïve theories; and on the other hand, it gives them a precise and comprehensive attitude toward metaphysical presupposition of scientific theories. As Einstein put it:

Many people today –and even professional scientists- seem to me like someone who has seen thousands of trees but has never seen a forest. A knowledge of the historic and philosophical background gives that kind of independence from prejudices of his generation from which most scientists are suffering. This

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<sup>1</sup>Ibid., p. 176

<sup>2</sup>TOWNES, C., "Logic and Uncertainties in Science and Religion", *Science and the future of mankind*, Pontifical Academy of Science, Scripta Varia 99, Vatican City, 2011, p. 299

<sup>3</sup>Ibid., p 299

<sup>4</sup>SCHRODINGER, E., *My View of the World*, Cambridge, Cambridge University Press, 1964, p. 5

independence created by philosophical insight –in my opinion- the mark of distinction between a mere artisan or specialist and a real seeker after truth<sup>1</sup>.

Heisenberg, who had begun with purely positivistic thought in the first decades of 20<sup>th</sup> century, changed his mind in the seventies:

In fact, I believe that certain erroneous developments in particle theory... are caused by a misconception by some physicists that it is possible to avoid philosophical arguments altogether. Starting with poor philosophy, they pose the wrong questions. It is only a slight exaggeration to say that good physics has at times been spoiled by poor philosophy<sup>2</sup>.

## 5. Conclusion

In this paper, we have argued that the naturalist's position about metaphysics and its relation with science faces with two essential difficulties. First, naturalist's position is self-defeating, i.e. on the one hand, naturalist doesn't accept any kind of knowledge prior to science, and on the other hand, it needs metaphysics for justifying rules, methods of reasoning, methodologies of inquiry, and principles of epistemology; or it must appeal to metaphysics for justifying methodological naturalism, otherwise it (MN) becomes a naturalistic dogma. Second, when we examine the history of scientific theories, we find that metaphysics as a knowledge prior to science has an important role in formation and development of scientific theories. In fact, metaphysical ideas provide an indispensable framework within which specific theories can be constructed and compared with experience, the framework without which further construction is impossible.

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<sup>1</sup>HOWARD, D., "Albert Einstein as Philosopher of Science", *Physics Today* 58, No.12 (2005), p. 34

<sup>2</sup>HEISENBERG, W., "The nature of elementary particles", *Physics Today* 29, No.3 (1976), p. 32

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