



Philosophy, Discovery, and Advancement of Knowledge

by

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ABSTRACT: According to a widespread opinion, philosophy has lost its bite and is a relic of past glories, because it is irrelevant to the advancement of knowledge. This sharply distinguishes the present philosophy from the philosophy of the past. For, in some important moments of its development, philosophy has played a relevant role in the advancement of knowledge, even leading to the birth of new sciences. To overcome the present impasse of philosophy, this paper proposes a view of philosophy according to which philosophy is acquisition of knowledge, it can contribute to the advancement of knowledge in several manners, in particular by improving the methods of acquisition of knowledge, and can even lead to the birth of new sciences.

KEYWORDS: Philosophy as acquisition of knowledge, Philosophy as rephrasing, Philosophy and question answering, Philosophy and clarification, Philosophy and method, Philosophy and the birth of new sciences

ABSTRACT: Secondo un'opinione diffusa, la filosofia ha perso mordente ed è un avanzo di glorie passate, perché è irrilevante all'avanzamento della conoscenza. Questo distingue nettamente la filosofia attuale dalla filosofia del passato. Infatti, in alcuni importanti momenti del suo sviluppo, la filosofia ha svolto un ruolo rilevante nell'avanzamento della conoscenza, anche portando alla nascita di nuove scienze. Per superare l'attuale impasse della filosofia, questo articolo propone una concezione della filosofia secondo cui la filosofia è acquisizione di conoscenza, può contribuire all'avanzamento della conoscenza in diversi modi, in particolare migliorando i metodi di acquisizione della conoscenza, e può anche portare alla nascita di nuove scienze.

KEYWORDS: Filosofia come acquisizione di conoscenza, Filosofia come riformulazione, Filosofia e risposta alle domande, Filosofia e chiarificazione, Filosofia e metodo, Filosofia e nascita di nuove scienze

1. Introduction

According to a widespread opinion, philosophy has lost its bite and is a relic of past glories, because it is irrelevant to the advancement of knowledge.

Wittgenstein even says that it is «essential to» philosophical «investigation that we do not seek to learn anything new by it»¹.

This sharply distinguishes the present philosophy from the philosophy of the past. For, in some important moments of its development, philosophy has played a relevant role in the advancement of knowledge, even leading to the birth of new sciences.

Thus, Galileo said that there was an intimate connection between the newborn modern science and «the true and good philosophy, especially concerning the constitution of the universe»². Galileo himself had «studied for a greater number of years in philosophy than months in pure mathematics»³.

To overcome the present impasse of philosophy, this paper proposes an approach to philosophy according to which philosophy is acquisition of knowledge, it can contribute to the advancement of knowledge in several manners, in particular by improving the methods of acquisition of knowledge, and can even lead to the birth of new sciences.

2. Philosophy as Acquisition of Knowledge in Antiquity

According to several Greek philosophers, philosophy is an inquiry aimed at acquiring knowledge, briefly, it is acquisition of knowledge. This is affirmed already by the Presocratics.

Thus, Pythagoras says that «every human being has been made up by the god to know and inquire»⁴. In particular, «when Pythagoras was asked» what «is the thing for the sake of which nature and the god engendered us», he «replied: to inquire the heavens», and said that «he himself

¹ L. Wittgenstein, *Philosophical Investigations*, transl. G. E. M. Anscombe, Wiley-Blackwell, Oxford 2009, p. 47.

² G. Galilei, *Opere*, Barbera, Firenze 1968, vol. VII, p. 102. All translations of texts quoted are mine, unless otherwise stated.

³ *Ibidem*, vol. X, p. 353.

⁴ Aristotle, *Protrepticus*, ed. I. Düring (*Aristotle's Protrepticus: An Attempt at Reconstruction*, Institute of Classical Studies, Göteborg 1961), fr. 20.

was an inquirer of nature and had come to life for this purpose»⁵.

Heraclitus says that «philosophers must be good inquirers»⁶. To be sure, «nature loves to conceal herself»⁷. So, in the inquiry of nature, the philosopher risks being like those «seekers of gold» who «dig up much earth, but find little gold»⁸. Nevertheless, the inquiry of nature can be successful, because «what encompasses us», namely nature, «is rational and endowed with intelligence»⁹. And the mind «recognizes the intelligence which rules all things through all things»¹⁰.

Xenophanes says that «the gods did not reveal all things to mortals from the outset, but in time, by inquiring, mortals discover things better»¹¹. They can do so by making hypotheses, because «making hypotheses is available to everybody»¹².

Parmenides says that the philosopher «must inquire into everything»¹³. So he «will know the nature of the aether, and in the aether all the stars, and the resplendent works of the glowing sun's clear torch and whence they arose»¹⁴. He will also know «the wandering deeds of the round-faced moon and her origin», and «the heaven that surrounds everything, whence it arose, and how Necessity bound it to keep the limits of the stars»¹⁵.

From this, it is clear that, according to Pythagoras, Heraclitus, Xenophanes, and Parmenides, philosophy is acquisition of knowledge. The same view of philosophy is put forward by the two most important philosophers of antiquity.

Thus, Plato says that «philosophy is acquisition of knowledge»¹⁶. The original name of philosophy, «philosophia», means «love of wisdom», and philosophy is «love of wisdom» because «what makes people wise is wisdom»¹⁷. But wisdom is in no way «different from knowledge», because people are «wise in just those things of which

⁵ Ivi, fr. 18 Düring.

⁶ Heraclitus 22 B 35 D-K.

⁷ Ivi, 22 B 123.

⁸ Ivi, 22 B 22.

⁹ Ivi, 22 A 16.

¹⁰ Ivi, 22 B 41.

¹¹ Xenophanes 21 B 18 D-K.

¹² Ivi, 21 B 34.

¹³ Parmenides 28 B 1.28 D-K.

¹⁴ Ivi, 28 B 10.1-3.

¹⁵ Ivi, 28 B 10.4-7.

¹⁶ Plato, *Euthydemus*, 288 d 8.

¹⁷ Plato, *Theaetetus*, 145 d 11.

they have knowledge», so «knowledge and wisdom are the same thing»¹⁸. Therefore, «to be a philosopher is the same thing as to be a lover of knowledge»¹⁹. Indeed, only «the one who wholeheartedly tries all knowledge, who is eager to know and is insatiable for it, can be rightly called a philosopher»²⁰. Philosophy aims at acquiring all possible knowledge about the world and at giving a global view of it, because «anyone who can have a global view is a philosopher, and anyone who can't isn't»²¹. Admittedly, not all acquisition of knowledge is «a right acquisition» of knowledge, but only «one which will benefit us»²². Thus «the kind of knowledge we need is that which combines making and knowing how to use the thing made»²³. For, only that kind of knowledge can improve our quality of life.

Aristotle says that «by nature, all humans desire to know»²⁴. This especially holds of philosophers, because they aim at knowledge about «the first causes and the principles of things»²⁵. That kind of knowledge is «the ultimate thing for the sake of which we have come to be»²⁶.

Plato and Aristotle say not only that philosophy is acquisition of knowledge, but also that the acquisition of knowledge requires a method, and philosophy provides such a method.

Indeed, Plato says that, proceeding without method, «would be like walking with the blind. But someone who goes about his subject skillfully must not be like the blind»²⁷. Philosophy provides such a method and, «if we are to believe Hippocrates» of Cos, the physician, we cannot learn anything «unless we follow this method»²⁸.

Aristotle says that, to be able to acquire knowledge, «one must have been educated in the method by which each thing should be produced»²⁹. Philosophy provides such a method. It indicates «how to reach for premises concerning any problem proposed, in the case of

¹⁸ Ivi, 145 e 1-6.

¹⁹ Plato, *Respublica*, II, 376 b 9-10.

²⁰ Ivi, V, 475 c 6-8.

²¹ *Ibidem*, VII, 537 c 7.

²² Plato, *Euthydemus*, 288 d 9-e 2.

²³ Ivi, 289 b 4-6.

²⁴ Aristotle, *Metaphysica*, A I, 980 a 21.

²⁵ Ivi, A I, 981 b 28-29.

²⁶ Aristotle, *Protrepticus*, 32fr. 17 Düring.

²⁷ Plato, *Phaedrus*, 270 d 9-e 2.

²⁸ Ivi, 270 c 3-5.

²⁹ Aristotle, *Metaphysica*, α 3, 995 a 12-13.

any discipline whatever», and generally, how to find «the way through which we may obtain the principles concerning each subject»³⁰. Indeed, philosophy will «tell how we will always find syllogisms on any given subject, and by what method we will find the premises about each thing. For, surely one ought not only to investigate how syllogisms are constituted, but also to have the ability to produce them»³¹.

Thus, Plato and Aristotle put forward a view of philosophy according to which philosophy is acquisition of knowledge, the acquisition of knowledge requires a method, and philosophy provides such a method.

3. Philosophy as Acquisition of Knowledge in the Modern Period

The view that philosophy is acquisition of knowledge is reaffirmed by several modern philosophers.

Thus, Bacon says: «I have taken all knowledge to be my province»³². It is «to be expected that there are still hidden in the bosom of nature many secrets of excellent use, which have no affinity or parallelism with things already discovered», and «have not yet been discovered»³³. But, «by the method that we are now treating, they can be speedily and suddenly and simultaneously represented and anticipated» (*ibid.*).

Descartes says: «Philosophy» is «the study of wisdom», where «by “wisdom” is meant not only prudence in everyday affairs, but also a perfect knowledge of all things that mankind is capable of knowing»³⁴. Indeed, «to try to acquire» this kind of knowledge «is properly termed philosophizing»³⁵. Philosophy also provides a method to solve «all problems which can be proposed concerning any sort of quantity, whether continuous or discrete»³⁶.

Hobbes says: «Philosophy» is «the study of wisdom»³⁷. And «wisdom, properly called, is nothing else» but «the perfect knowledge of the truth in all matters whatsoever»³⁸.

³⁰ Aristotle, *Analytica Priora*, B 1, 53 a 1-3.

³¹ *Ivi*, A 27, 43 a 20-24.

³² F. Bacon, *Letters and Life*, Longmans, London 1861-1874, vol. I, p. 109.

³³ F. Bacon, *Works*, Longmans, London 1857-1874, vol. I, p. 208.

³⁴ R. Descartes, *Oeuvres*, Vrin, Paris 1996, vol. IX.2, p. 2.

³⁵ *Ibidem*.

³⁶ *Ivi*, vol. X, pp. 156-157.

³⁷ T. Hobbes, *English Works*, Longman, London 1839-1845, vol. I, p. xiv.

³⁸ *Ivi*, vol. II, p. iii.

Kant says: «We would do well to leave» the word “philosophy” «in its ancient sense», as «the doctrine of wisdom», because this «would suit the Greek expression (which signifies love of wisdom) while yet sufficing to embrace under the name of philosophy love of science and so of all speculative rational cognition»³⁹. Indeed, «philosophy» is «a complex of cognitions»⁴⁰. So, «without cognitions one will never become a philosopher»⁴¹.

The statements of Greek and modern philosophers quoted above are not isolated. For example, the view that philosophy is acquisition of knowledge is the view of philosophy underlying a recent history of philosophy in many volumes by Chiaradonna and Pecere⁴². Indeed, Chiaradonna and Pecere say that «philosophy is a true laboratory» in which «new forms of knowledge and understanding of the world are formulated and experienced»⁴³. Philosophy «represents, in a privileged way, the moment of the search for knowledge, the creation of new forms of knowledge»⁴⁴. In particular, «studying philosophy reminds us that there is still a lot to be written on the path of knowledge», and this is «the most vital heritage that the study of philosophy can offer to the young people who approach it»⁴⁵.

4. *Philosophy as Rephrasing*

In contrast with the philosophical tradition, however, the view that philosophy is acquisition of knowledge is completely abandoned in the twentieth century, and is mainly replaced by the view that philosophy is rephrasing. According to the latter, philosophy is not acquisition of knowledge, it can only clarify existing knowledge, thus improving our understanding of it, by assembling and marshalling what we already know.

³⁹ I. Kant, *Critique of Practical Reason*, transl. M. Gregor, Cambridge University Press, Cambridge 2015, p. 88.

⁴⁰ I. Kant, *Lectures on Logic*, transl. J. M. Young, Cambridge University Press, Cambridge 1992, p. 436.

⁴¹ Ivi, p. 538.

⁴² R. Chiaradonna-P. Pecere, *Filosofia: La ricerca della conoscenza*, Mondadori, Milan 2018.

⁴³ Ivi, vol. IA, p. v.

⁴⁴ *Ibidem*.

⁴⁵ *Ibidem*.

Thus, Collingwood says that «philosophical reasoning leads to no conclusions which we did not in some sense know already»⁴⁶. Philosophy «does not, like exact or empirical science, bring us to know things of which we were simply ignorant», it only «brings us to know in a different way things which we already knew in some way»⁴⁷.

Wittgenstein says that «philosophy gives no pictures of reality»⁴⁸. In philosophy «there are no great essential problems in the sense of science»⁴⁹. In it «we may not advance any kind of theory», and «the problems are solved, not by coming up with new discoveries, but by assembling what we have long been familiar with»⁵⁰. In philosophy «we want to understand something that is already in plain view»⁵¹.

Ryle says that «philosophy is not a sister science or a parent science», its «business is not to add to the number of scientific statements»⁵². Philosophy is «intended not to increase what we know», but only «to rectify the logical geography of the knowledge which we already possess»⁵³. For, philosophy is only «the clarification of ideas»⁵⁴. Philosophy «does not discover, or look for, new matters», in a sense «the philosopher throws new light, but he does not give new information»⁵⁵.

Dummett says that «philosophy does not advance knowledge»⁵⁶. It «stands in complete contrast with sciences», its «methods wholly diverge from those of science», its «objective differs to an equal extent», and its results «differ fundamentally in character from those of the sciences»⁵⁷. Philosophy does not aim «to discover new facts about» reality, it only «seeks to improve our understanding of what we already know»⁵⁸.

⁴⁶ R. G. Collingwood, *An Essay on Philosophical Method*, Oxford University Press, Oxford 2005, p. 161.

⁴⁷ *Ibidem*.

⁴⁸ L. Wittgenstein, *Notebooks 1914-1916*, transl. G. E. M. Anscombe, Blackwell, Oxford 1998, p. 106.

⁴⁹ L. Wittgenstein, *The Big Typescript TS 213*, transl. C. G. Luckhardt, and M. A. E. Aue, Blackwell, Oxford 2005, p. 301.

⁵⁰ L. Wittgenstein, *Philosophical Investigations*, cit., p. 52.

⁵¹ *Ivi*, p. 47.

⁵² G. Ryle, *Collected Papers*, Routledge, London 2009, vol. I, pp. 261-262.

⁵³ G. Ryle, *The Concept of Mind*, Routledge, London 2009, p. lix.

⁵⁴ G. Ryle, *Collected Papers*, cit., vol. II, p. 212.

⁵⁵ *Ibidem*, vol. II, p. 173.

⁵⁶ M. Dummett, *The Nature and Future of Philosophy*, Columbia University Press, New York 2010, p. 21.

⁵⁷ *Ivi*, p. 7.

⁵⁸ *Ivi*, p. 10.

Hacker says that philosophy is not «engaged, like» the «sciences, in the pursuit of knowledge of the world»⁵⁹. It provides no new knowledge, «indeed, one might say, with only a little exaggeration, that in philosophy, ‘If it’s news, it’s wrong’»⁶⁰. In fact, «philosophy is not a contribution to human knowledge, but to human understanding»⁶¹. To reach understanding one need not acquire new knowledge, «one need only assemble and marshal what one already knows»⁶².

Of course, if philosophy is not acquisition of knowledge, then questions about method are no longer a major object of investigation in philosophy.

Indeed, Ryle says that «preoccupation with questions about methods tends to distract us from prosecuting the methods themselves. We run, as a rule, worse, not better, if we think a lot about our feet»⁶³.

Compare this with Descartes’s view. According to him, philosophy must develop a method, because «it is far better to never think of investigating the truth of anything than to do so without a method»⁶⁴. To have no method is to be like a person who «is burning with such a stupid desire to find a treasure, that he constantly roams about the streets to see if by chance he might find one lost by a passer-by»⁶⁵.

5. *Philosophy and Question Answering*

That the view of philosophy as acquisition of knowledge is completely abandoned in the twentieth century, is due to the conviction, widespread throughout the century and beyond, that, while the sciences answer questions, philosophy cannot answer them, it can only ask them.

Thus, Russell says that «there are many questions» that «are asked by philosophy, and variously answered by various philosophers», but «the answers suggested by philosophy are none of them demonstra-

⁵⁹ P. M. S. Hacker, *Wittgenstein: Comparisons and Context*, Oxford University Press, Oxford 2013, p. xx.

⁶⁰ Ivi, p. 19.

⁶¹ Ivi, p. 9.

⁶² P. M. S. Hacker, *The Intellectual Powers: A Study of Human Nature*, Wiley-Blackwell, Chichester 2013, p. 454.

⁶³ G. Ryle, *Collected Papers*, cit., vol. II, p. 331.

⁶⁴ R. Descartes, *Oeuvres*, Vrin, Paris 1996, vol. X, p. 371.

⁶⁵ *Ibidem*.

bly true»⁶⁶. So, we cannot «include as part of the value of philosophy any definite set of answers to such questions»⁶⁷. Philosophy «is to be studied, not for the sake of any answers to its questions», but «rather for the sake of the questions themselves»⁶⁸. Indeed, «the value of philosophy» cannot «depend upon any supposed body of definitely ascertainable knowledge to be acquired by those who study it», on the contrary, it is «to be sought largely in its very uncertainty»⁶⁹.

Gadamer says that philosophy is not a discipline «by means of which we could master the discovery of truth», instead, it is «the art of questioning»⁷⁰. Philosophy «proves its value because only the person who knows how to ask questions is able to persist in his questioning», and «the art of questioning is the art of questioning ever further – i.e., the art of thinking»⁷¹.

Bobbio says that, while «science gives partial answers», and yet answers, «philosophy only asks questions without giving answers»⁷². Thus, «one must not expect of philosophy what one expects of science, namely answers, not even partial ones»⁷³. Indeed, «beyond the territories conquered by the scientific enterprise, there are only questions without answer»⁷⁴.

6. Consequences of the Denial of Philosophy as Acquisition of Knowledge

The abandonment of the view of philosophy as acquisition of knowledge has had a very negative effect on philosophy. Philosophy has become more and more inward-looking and self-referential, of no interest to people working in other areas, or to cultured people at large.

In particular, several important scientists and mathematicians have claimed that the present philosophy is irrelevant to knowledge, or even that philosophy is dead.

⁶⁶ B. Russell, *The Problems of Philosophy*, Oxford University Press, Oxford 1998, p. 90.

⁶⁷ Ivi, p. 91.

⁶⁸ Ivi, p. 93.

⁶⁹ Ivi, p. 91.

⁷⁰ H.-G. Gadamer, *Truth and Method*, transl. J. Weinsheimer and D. G. Marshall, Continuum, London 2004, p. 360.

⁷¹ *Ibidem*.

⁷² N. Bobbio, *La filosofia e il bisogno di senso*, Morcelliana, Brescia 2017, p. 46.

⁷³ Ivi, p. 31.

⁷⁴ Ivi, p. 67.

Thus, Dirac says that «the field of philosophy has terribly declined. I feel that philosophy will never lead to important discoveries. It's just a way of talking about discoveries which have already been made»⁷⁵.

Weinberg says: «I know of no one who has participated actively in the advance of physics in the postwar period whose research has been significantly helped by the work of philosophers»⁷⁶. Philosophy of science «at its best seems to me a pleasing gloss on the history and discoveries of science. But we should not expect it to provide today's scientists with any useful guidance»⁷⁷.

Dyson says that, «compared with the giants of the past», the present philosophers «are a sorry bunch of dwarfs», they «are historically insignificant. At some time toward the end of the nineteenth century, philosophers faded from public life», they «suddenly and silently vanished. So far as the general public was concerned, philosophers became invisible», and philosophy lost «its bite», it became a «relic of past glories»⁷⁸.

Krauss says that «science progresses and philosophy doesn't», and «the worst part of philosophy is the philosophy of science; the only people» who «read work by philosophers of science are other philosophers of science. It has no impact on physics whatsoever», so «it's really hard to understand what justifies it»⁷⁹.

Wolpert says: «No scientist that I know of» has «the slightest interest in the philosophy of science», because in this century the philosophy of science «has contributed zero to the understanding of the scientific process»⁸⁰. Scientists «are very ambitious. They're very competitive. If they really thought philosophy would help them, they'd learn it and use it. They don't»⁸¹.

Rota says: «Our latter-day philosophers are not concerned with facing up» to «any relevant features» whatsoever «of the world»⁸².

⁷⁵ T. S. Kuhn, *Interview of P. A. M. Dirac, 6 May 1963*, Niels Bohr Library & Archives, American Institute of Physics, College Park 1963.

⁷⁶ S. Weinberg, *Dreams of a Final Theory*, Vintage Books, New York 1993, pp. 168-169.

⁷⁷ Ivi, p. 167.

⁷⁸ F. J. Dyson, *Dreams of Earth and Sky*, The New York Review of Books, New York 2015, p. 243.

⁷⁹ L. Krauss, *Has Physics Made Philosophy and Religion Obsolete?* Interview by R. Andersen, «The Atlantic», April 23, 2012.

⁸⁰ L. Wolpert, *Round Table Debate: Science Versus Philosophy?* «Philosophy Now», 27 (2000).

⁸¹ *Ibidem*.

⁸² G.-C. Rota *Indiscrete Thoughts*, Birkhäuser, Boston 1997, pp. 102-103.

Therefore, «like ostriches with their heads buried in the sand, they will meet the fate of those who refuse to remember the past and fail to face the challenges of our difficult present: increasing irrelevance followed by eventual extinction»⁸³.

Hersh says: «A famous mathematician said to me, ‘I am willing to leave that question to the philosophers.’ Which philosophers? Professional philosophers who are not mathematicians?! To obtain answers meaningful to us, I’m afraid we’ll have to get to work ourselves»⁸⁴.

Hawking says that, while questions such as «How can we understand the world in which we find ourselves?» have been traditionally «questions for philosophy», now «philosophy is dead», it has become unable to advance knowledge, «scientists have become the bearers of the torch of discovery in our quest for knowledge»⁸⁵.

However, it is one thing to claim that the present philosophy is irrelevant to knowledge, and quite another thing to claim, like Hawking, that philosophy is dead. Indeed, concerning this claim, at a debate held at the British Academy, «Crane said» that «Hawking himself», with his claim, «proved that philosophy is unavoidable, since he put forward a lot of philosophical views. Unfortunately, these amounted to “bad philosophy, because he is unaware of it as a discipline and a practice with a history”»⁸⁶.

In fact, that the present philosophy is irrelevant to knowledge does not mean that philosophy is dead, but only that the present philosophy is totally inadequate, and that an alternative approach to philosophy is necessary.

7. Philosophy and Clarification

It might be thought that the claim by several important scientists and mathematicians that the present philosophy is irrelevant to knowledge is disproved by the view of philosophy as rephrasing, by which philosophy can clarify existing knowledge, thus improving our

⁸³ Ivi, p. 103.

⁸⁴ R. Hersh, *Reply to Martin Gardner*, «The Mathematical Intelligencer» 23/2 (2001), pp. 3-5, p. 4.

⁸⁵ S. W. Hawking-L. Mlodinow, *The Grand Design*, Bantam Books, New York 2010, p. 5.

⁸⁶ M. Reisz, *Is Philosophy Dead?*, «Times Higher Education», February 22 (2015).

understanding of it. Some supporters of this view argue that, even if philosophy cannot add to our knowledge of the world or mathematics, it can be useful to knowledge, because the natural sciences and mathematics contain conceptual confusions that are an obstacle to the advancement of knowledge. Philosophy can dispel them, clearing the ground for scientific and mathematical practice.

Thus, Hacker says that philosophy cannot «add to the sum of our knowledge of the world (or of mathematics)»⁸⁷. But «philosophy can contribute in a unique and distinctive way to understanding in the natural sciences and mathematics», because «it can clarify their conceptual features»⁸⁸. This is important because «the sciences are no more immune to conceptual confusion than is any other branch of human thought»⁸⁹. Philosophy can clarify such conceptual confusions since it is able «to solve or dissolve conceptual unclarity or misunderstanding, and to answer conceptual questions»⁹⁰. For example, it clarifies that «alternative geometries are not alternative theories of space but alternative grammars for the description of spatial relationships», and this «contributes to a better understanding of the enterprise of geometry»⁹¹. Philosophy clarifies conceptual features of the sciences and mathematics through an investigation into «the uses of words, phrases, and sentences»⁹². The investigation concerns «rules for the use of the words signifying things»⁹³. This only requires «one's competence as a mature language-user (aided by the reminders of the *Oxford English Dictionary* and by the etymology and history of words it provides)»⁹⁴.

This view is just a revival of Locke's view of the philosopher as an under-labourer for the sciences. According to it, the philosopher is «to be employed as an under-labourer in clearing ground a little, and removing some of the rubbish, that lies in the way to knowledge», which is «cumbered with the learned but frivolous use of uncouth,

⁸⁷ P. M. S. Hacker, *Wittgenstein: Comparisons and Context*, cit., p. 11.

⁸⁸ *Ivi*, p. 10.

⁸⁹ P. M. S. Hacker, *Why Study Philosophy? What Does Philosophy Actually Do?* «Institute of Art and Ideas» 2 (2018), <https://iai.tv/articles/why-study-philosophy-auid-289> [06.06.2021].

⁹⁰ P. M. S. Hacker, *The Intellectual Powers: A Study of Human Nature*, cit., p. 462.

⁹¹ P. M. S. Hacker, *Wittgenstein: Comparisons and context*, cit., p. 11.

⁹² *Ivi*, p. 17.

⁹³ P. M. S. Hacker, *The Intellectual Powers: A Study of Human Nature*, cit., p. 446.

⁹⁴ *Ivi*, p. 451.

affected, or unintelligible terms, introduced into the sciences»⁹⁵.

This view of the philosopher as an under-labourer for the sciences, however, is untenable. Indeed, it is unrealistic that philosophy can clarify conceptual confusions of the sciences and mathematics because it is able to solve or dissolve conceptual unclarity or misunderstanding, and to answer conceptual questions. This is contradicted by the above statements of several important scientists and mathematician. For example, it is contradicted by Weinberg's statement that he knows of no physicist in the period after World War II, whose research has been significantly helped by the work of philosophers.

In particular, it is untenable that alternative geometries are not alternative theories of space but alternative grammars for the description of spatial relationships. This is contradicted by the fact that non-Euclidean geometries were introduced because their creators felt that Euclidean geometry was inadequate as a theory of certain kinds of spaces. For example, Riemann formulated elliptic geometry because he felt that Euclidean geometry was inadequate as a theory of space in the infinitely small, since «we cannot draw conclusions from metric relations of the great, to those of the infinitely small»⁹⁶.

Moreover, it is totally implausible that it is possible to solve or dissolve conceptual unclarity or misunderstanding, and answer conceptual questions sharply, simply on the basis of one's competence as a mature language-user, aided by the *Oxford English Dictionary*. For example, it is totally implausible that it would have been possible to dissolve the incoherence of the naive concept of set, according to which a set is any collection of elements, simply by looking up the word 'set' in the *Oxford English Dictionary*. Zermelo did not dissolve the incoherence of the naive concept of set by an investigation into the uses of the word 'set', but by a completely different kind of investigation, that led him to a new concept of set.

8. *The Alternative of Philosophy as Acquisition of Knowledge*

Given the inadequacy of the present view of philosophy, an alternative

⁹⁵ J. Locke, *An Essay Concerning Human Understanding*, Oxford University Press, Oxford 1975, p. 10.

⁹⁶ B. Riemann, *On the Hypotheses Which Lie at the Bases of Geometry*, transl. W. K. Clifford, Birkhäuser, Cham 2016, pp. 39-40.

view is necessary. The latter is provided by an updated version of Plato's and Aristotle's view of philosophy. According to it, philosophy is acquisition of knowledge, it can contribute to the advancement of knowledge in several manners, in particular by improving the methods of acquisition of knowledge, and can even lead to the birth of new sciences.

In saying that philosophy is acquisition of knowledge, the term "knowledge" is supposed to include methods of acquisition of knowledge. Indeed, the acquisition of knowledge may require new methods, since nothing guarantees that the methods that permitted the acquisition of the present knowledge will also permit the acquisition of new kinds of knowledge. Therefore, "knowledge" must include methods of acquisition of knowledge.

Grice even says: «By and large the greatest philosophers have been the greatest, and the most self-conscious, methodologists; indeed, I am tempted to regard this fact as primarily accounting for their greatness as philosophers»⁹⁷.

9. *The Relation between Philosophy and the Sciences*

That philosophy is acquisition of knowledge involves that philosophy is continuous with the sciences, in the sense that it aims at a kind of knowledge that is not essentially different from scientific knowledge and is not limited to any area. Like the sciences, philosophy is interested in any question concerning the world, and ourselves in it. As Russell says, «what concerns philosophy is the universe as a whole»⁹⁸.

The only difference between philosophy and the sciences is that philosophy strives for questions that go beyond the present sciences. The present sciences are what we already know, philosophy aims at acquiring knowledge about what we do not yet know – not about open questions of the present sciences, but about open questions of none of the present sciences. By dealing with such open questions, philosophy can even give rise to new sciences.

⁹⁷ P. Grice, *Reply to Richards*, in R. E. Grandy-R. Warner (eds.), *Philosophical Grounds of Rationality: Intentions, Categories, Ends*, Oxford University Press, Oxford 1986, pp. 45-106, p. 66.

⁹⁸ B. Russell, *An Outline of Philosophy*, Routledge, London 1995, p. 189.

10. *Previous Contributions of Philosophy to the Advancement of Knowledge*

The possibility of a philosophy as acquisition of knowledge is not wishful thinking. Philosophy has had an essential role in the birth of modern science, because the latter has been made possible only by Galileo's philosophical revolution, his change in the object of science with respect to Aristotle⁹⁹. But the influence of philosophy on science has not ended there.

As Rovelli says, «Einstein would have never done relativity without having read all the philosophers and having a head full of philosophy» and «Heisenberg would have never done quantum mechanics without being full of philosophy», it is this «that allows him to construct this fantastically new physical theory, scientific theory, which is quantum mechanics»¹⁰⁰. The same holds of «Maxwell, Boltzmann»¹⁰¹. Generally, «all the major steps of science in the past were done by people who were very aware of methodological, fundamental, even metaphysical questions being posed»¹⁰².

Philosophy has had an essential role also in the birth of non-physical sciences. For example, in the twentieth century, both computer science and cognitive science originated from Turing's philosophical analysis of the computational behaviour of human beings. The philosophical character of Turing's analysis is clear from «the enthusiastic philosophical reception of Turing's approach», which «stands in stark contrast to the very limited attention given to it in print in the following decade»¹⁰³.

There is no reason to suppose that new sciences will not be born in the future, and that none of them will originate from philosophy.

II. *Objections to Philosophy as Acquisition of Knowledge*

Against the view that philosophy is acquisition of knowledge, some

⁹⁹ See C. Cellucci, *Rethinking Logic: Logic in Relation to Mathematics, Evolution, and Method*, Springer, Cham 2013, Chapter 8.

¹⁰⁰ C. Rovelli, *Science Is Not about Certainty: A Philosophy of Physics*, «Edge», May 30 (2012), <https://www.edge.org/conversation/a-philosophy-of-physics> [06.06.2021].

¹⁰¹ *Ibidem*.

¹⁰² *Ibidem*.

¹⁰³ J. Mosconi, *The Development of the Concept of Machine Computability from 1936 to the 1960s*, in J. Dubucs-M. Bourdeau (eds.), *Constructivity and Computability in Historical and Philosophical Perspective*, Springer, Dordrecht 2014, pp. 37-56, p. 38.

scientists and philosophers have objected that, after the birth of modern science, only science can be acquisition of knowledge, so only the present science can advance knowledge.

Thus, Rutherford says: «All science is either physics or stamp collecting»¹⁰⁴.

Crick says: «The knowledge we have already makes it highly unlikely that there is anything that cannot be explained by physics and chemistry»¹⁰⁵.

Russell says that «whatever knowledge is attainable, must be attained by» the present «scientific methods; and what» the present «science cannot discover, mankind cannot know»¹⁰⁶.

Quine says that the philosopher can only carry out «his reasoning within the inherited world theory»¹⁰⁷. That is, within the present science.

The objection, however, is unfounded, because it is based on two invalid assumptions.

The first assumption is that science is acquisition of knowledge because it is based on a method that is available to science but not to philosophy, namely, the «new scientific method which was fashioned almost entirely by Galileo Galilei»¹⁰⁸. This assumption is invalid because, while Galileo changed the object of science with respect to Aristotle, contrary to a widespread misunderstanding he did not fashion a new scientific method. Both Galileo and Newton declared to use, and actually used, Aristotle's analytic-synthetic method as the method of modern science¹⁰⁹.

The second assumption is that knowledge is exhausted by the present scientific method and the present sciences, so the latter are the only possible channel of knowledge. This assumption is invalid because there are many things we still do not know, even on fundamental issues, and there is no evidence that they can be known by the present scientific methods and the present sciences, and hence that they do not require new scientific methods and the creation of new sciences.

There is much space for philosophy, because philosophy is about what we do not yet know, and the things that we do not yet know are

¹⁰⁴ J. B. Birks, *Rutherford at Manchester*, W.A. Benjamin, New York 1963, p. 108.

¹⁰⁵ F. Crick, *Of Molecules and Men*, University of Washington Press, Seattle 1966, p. 14.

¹⁰⁶ B. Russell, *Religion and Science*, Oxford University Press, Oxford 1974, p. 243.

¹⁰⁷ W. V. O. Quine, *Theories and Things*, Harvard University Press, Cambridge 1981, p. 72.

¹⁰⁸ M. Kline, *Mathematics for the Nonmathematician*, Dover, Mineola 1985, p. 284.

¹⁰⁹ See C. Cellucci, *Rethinking logic: Logic in relation to mathematics, evolution, and method*, cit., Chapter 8.

plentiful, although we are not aware of it. Seneca even said: «the time will come when our posterity will marvel that we did not know such obvious things»¹¹⁰.

12. *Philosophy and Mathematics*

If philosophy has had an essential role in the birth of modern science, there is a discipline with which it has had an important relation from antiquity: mathematics.

Indeed, on the one hand, mathematics played an important role in the birth of philosophy as discipline¹¹¹. On the other hand, philosophy has been relevant to mathematics in many ways, either by providing analyses of mathematical concepts, or by exposing the inadequacy of mathematical concepts, or by formulating new methods of discovery and justification¹¹².

Especially strict has been the relation between philosophy and mathematics as concerns method.

Thus, Plato gave rise to philosophy as discipline by modelling the method of philosophy on the method used by Hippocrates of Chios to solve problems in mathematics, namely the analytic method. Hippocrates of Chios did not give a formulation of the method, simply used it, Plato give the first formulation¹¹³. Moreover, in Plato there is «the only extant example of proof by» complete induction «in the ancient mathematical corpus»¹¹⁴.

On the other hand, Aristotle gave the first formulation of the analytic-synthetic method, or method of analysis and synthesis, and, as a byproduct, he gave the first formulation of the axiomatic method¹¹⁵.

Thus Plato and Aristotle gave the first formulations of the most basic methods of mathematics.

¹¹⁰ Seneca, *Naturales Quaestiones*, 7.25.

¹¹¹ See C. Cellucci, *The Making of Mathematics: Heuristic Philosophy of Mathematics*, Springer, Cham, to appear, Chapter 1.

¹¹² *Ibidem*.

¹¹³ Ivi, Chapter 5.

¹¹⁴ F. Acerbi, *Plato: Parmenides 149 a 7-c 3. A proof by Complete Induction?*, «Archive for History of Exact Science» 55 (2000), pp. 57-76, p. 58.

¹¹⁵ See C. Cellucci, *The Making of Mathematics: Heuristic Philosophy of Mathematics*, cit., Chapter 6.

13. *Method and Contemporary Mathematics*

As philosophy has been relevant to mathematics in many ways in the past, it could be relevant to it even today.

In the twentieth century the most important mathematical schools, notably those of Hilbert and Bourbaki, have supported the view that the method of mathematics is the abstract axiomatic method, and mathematical practice should be based on that method.

The abstract axiomatic method is the method according to which, in order to present, justify, and teach an already acquired proposition, one starts from given axioms and deduces the proposition from them. The axioms are not required to be true, in the sense that there must be a kind of things, specified in advance, of which the axioms are true. They are only required to be consistent, namely, not to imply contradictions. Apart from satisfying this requirement, the axioms can be chosen arbitrarily.

Thus, Hilbert says that axioms are only «characteristic marks of the concepts which are given» and «I must of course be free to do as I please in giving characteristic marks»¹¹⁶. So, the axioms can be chosen arbitrarily. The choice of the axioms is only subject to the condition that the axioms must not contradict one another. For, «if the arbitrarily given axioms do not contradict one another with all their consequences, then they are true and the things defined by the axioms exist. This is for me the criterion of truth and existence»¹¹⁷. The abstract axiomatic method is «the indispensable tool, appropriate to our minds, for all exact research in any field whatsoever: it is logically incontestable and at the same time fruitful; it thereby guarantees the maximum flexibility in research»¹¹⁸.

The view that the method of mathematics is the abstract axiomatic method, and mathematical practice should be based on that method, is still the prevailing view of mathematics.

Thus, Vialar says that «mathematics base theories on propositions postulated as true, which are called axioms and use only demonstra-

¹¹⁶ D. Hilbert, *Letter to Frege*, 29.12.1899, in G. Frege, *Philosophical and Mathematical Correspondence*, transl. H. Kaal, Blackwell, Oxford 1980, pp. 38-41, p. 39.

¹¹⁷ *Ivi*, pp. 39-40.

¹¹⁸ D. Hilbert, *The New Grounding of Mathematics: First Report*, transl. W. Ewald, in W. Ewald (ed.), *From Brouwer to Hilbert*, Oxford University Press, Oxford 1996, vol. 2, pp. 1117-1134, p. 1120.

tions deriving from these axioms»¹¹⁹. The only requirement on the axioms that «the construction of axiomatic systems imposes» is «consistency», namely «non-contradiction»¹²⁰ (*ibid.*). The «mathematician starts from axioms and definitions, and has also at disposal theorems already demonstrated; then the mathematician obtains new theorems by means of demonstrations», namely «chains of deduction that obey logical rules»¹²¹.

14. *Negative Implications of the Abstract Axiomatic Method for Mathematics*

The view that the method of mathematics is the abstract axiomatic method and mathematical practice should be based on that method, however, has several negative implications for mathematics.

1) The view leads to the trivialization of mathematical research, because it implies that the latter can be wholly made by a computer, mathematicians are unnecessary. This follows from the fact that the assumption reduces mathematical research to deducing propositions from arbitrarily chosen axioms, and there is an algorithm which generates all deductions, and hence all theorems, from given axioms. Thus, if mathematical research consists in deducing propositions from arbitrarily chosen axioms, then, as Turing says, we could «imagine that all proofs take the form of a search through this enumeration for the theorem for which a proof is desired»¹²². Therefore, the algorithm is all that is needed, mathematicians are superfluous.

2) The view leads one to think that mathematics is suitable only for belaboring the obvious. As Rota says, «the mistaken identification of mathematics with the» abstract «axiomatic method has led to a widespread prejudice among scientists that mathematics is nothing but a pedantic grammar, suitable only for belaboring the obvious and for producing marginal counterexamples to useful facts that are by and large true»¹²³.

3) The view leads to the parcelling-out of mathematical research.

¹¹⁹ T. Vialar, *Handbook of Mathematics*, Books on Demand, Norderstedt 2017, p. 6.

¹²⁰ *Ibidem.*

¹²¹ Ivi, p. 7.

¹²² A. M. Turing, *Systems of Logic Based on Ordinals*, in B. J. Copeland (ed.), *The Essential Turing*, Oxford University Press, Oxford 2004, pp. 146-204, p. 193.

¹²³ G.-C. Rota, *Indiscrete Thoughts*, cit., p. 142.

For, it encourages the mathematician to carve out a small space in which to work, losing sight of the final goal, or perhaps without even having one, often merely for career or funding reasons. Bourbaki himself admits that many mathematicians «take up quarters in a corner of the domain of mathematics», and «not only do they ignore almost completely what does not concern their special field, but they are unable to understand the language and the terminology used by colleagues who are working in a corner remote from their own»¹²⁴.

4) The view opens the way to an anarchic and uncontrolled development of mathematical research. Bourbaki himself admits that the abstract axiomatic method has favoured the creation of «monster-structures, entirely without applications; their only merit was that of showing the exact bearing of each axiom, by observing what happened if one omitted or changed it»¹²⁵.

5) The view leads to the obscurity of mathematics. As Rota says, because of the use of the abstract axiomatic method, «a piece of written mathematics cannot be understood and appreciated without additional strenuous effort. Clarity has been sacrificed to such shibboleths as consistency of notation, brevity of argument and the contrived linearity of inferential reasoning»¹²⁶. As a result, «the impenetrability of mathematical writing has isolated the community of mathematicians»¹²⁷.

6) The view breaks the connection between mathematics and concrete reality. Thus, Hilbert says that, through the abstract axiomatic method, mathematics «becomes completely detached from concrete reality», it «has nothing more to do with real objects»¹²⁸. It is «a pure thought construction, of which one can no longer say that it is true or false», and «the task of mathematics is» merely «to develop this framework of concepts in a logical way»¹²⁹.

¹²⁴ N. Bourbaki, *The Architecture of Mathematics*, transl. A. Dresden, in W. Ewald (ed.), *From Brouwer to Hilbert*, Oxford University Press, Oxford 1996, vol. 2, pp. 1265-1276, p. 1266.

¹²⁵ Ivi, p. 1275, fn. 9.

¹²⁶ G.-C. Rota, *Indiscrete Thoughts*, cit., p. 142.

¹²⁷ *Ibidem*.

¹²⁸ D. Hilbert, *Lectures on the Foundations of Arithmetic and Logic 1917-1933*, Springer, Dordrecht 2013, p. 435.

¹²⁹ *Ibidem*.

15. *The Aim of Improving Methods of Acquisition of Knowledge*

As already said, despite the negative consequences of the view that the method of mathematics is the abstract axiomatic method, the view is still the prevailing view of mathematics. This suggests that philosophy might have an important role in convincing recalcitrant mathematicians to replace it with a view without these negative implications, which could benefit mathematical research.

Such an alternative view is the view that the method of mathematics is a development of the method originally formulated by Plato, the analytic method¹³⁰.

This view involves a radical change in attitude towards discovery. According to the view that the method of mathematics is the abstract axiomatic method, discovery is an irrational process.

Thus, Dieudonné says that it is impossible to explain how mathematicians «arrived at their results», because «what goes on in a creative mind never has a rational “explanation”, in mathematics any more than elsewhere»¹³¹. All we know is that a mathematician has «sudden “illuminations”, and a “formalizing” of what these have revealed»¹³².

Feferman says that «the mathematician at work relies on surprisingly vague intuitions and proceeds by fumbling fits and starts with all too frequent reversals. In this picture» the «individual processes of mathematical discovery appear haphazard and illogical»¹³³. So «the creative and intuitive aspects of mathematical work evade logical encapsulation»¹³⁴.

On the contrary, according to the view that the method of mathematics is the analytic method, mathematical discovery is a rational process. The analytic method is a general method of discovery, and is a logical method because it is based on logical rules, both deductive and non-deductive rules.

That the analytic method is a general method of discovery has been acknowledged already in antiquity. According to the view that the method of mathematics is the analytic method, mathematics

¹³⁰ See C. Cellucci, *The Making of Mathematics: Heuristic Philosophy of Mathematics*, cit., Chapter 5.

¹³¹ J. Dieudonné, *Mathematics – The Music of Reason*, transl. H. G. Dales-J. C. Dales, Springer, Berlin 1998, p. 27.

¹³² *Ibidem*.

¹³³ S. Feferman, *In the Light of Logic*, Oxford University Press, Oxford 1998, p. 77.

¹³⁴ Ivi, 178.

is problem solving, while according to the view that the method of mathematics is the axiomatic method – already in the form of Euclid’s concrete axiomatic method – mathematics is theorem proving. Now, Carpus of Antioch points out that, for «problems, a general procedure has been invented, namely the method of analysis, by following which we can always hope to find a solution. Thus it is that even the most obscure problems can be pursued»¹³⁵. On the contrary, in the case of theorems, «no one to this day has been able to give us a general method of approaching them»¹³⁶.

Replacing the abstract axiomatic method as the method of mathematics with the analytic method could be a main aim of philosophy with respect to mathematics.

16. *The Aim of Contributing to the Birth of New Sciences*

As already stated, another main aim of philosophy could be to contribute to the birth of new sciences.

For example, let us consider the theories of evolution. Knowledge has an important role in evolution. Even simple organisms such as the prokaryotes cannot survive if they do not acquire knowledge about the environment. But the current theories of evolution completely disregard the role of knowledge in evolution. They do not take into account that knowledge is one of the means by which individuals can be fittest to survive, and an important one. Therefore, they are unable to explain, for example, why our earliest human ancestors, who were weak and vulnerable creatures compared to large mammals, were able to survive in the midst of stronger competing or threatening species. This can be explained only by arguing that they could outsmart those species by showing greater ingenuity in acquiring and making use of knowledge about the environment. This is just an example of the fact that knowledge is a life function, because it is essential to the life of all organisms¹³⁷. In order to survive, all organisms must explore the ecological possibilities available to them, and to this purpose they need to have knowledge about the environment. But the current the-

¹³⁵ Proclus, *In primum Euclidis Elementorum librum commentarii*, 242.14-17 Friedlein.

¹³⁶ Ivi, 242.19-20.

¹³⁷ See C. Cellucci, *The Making of Mathematics: Heuristic Philosophy of Mathematics*, cit., Chapter 17.

ories of evolution do not have the conceptual tools to deal with the role of knowledge in evolution, they have no place for knowledge as a life function.

Then, there is need for a new science that complements the current theories of evolution with a theory of knowledge. On account of its long-standing familiarity with the study of knowledge, philosophy could give an important contribution to the birth of this new science.

As another example, let us consider cognitive science. Mathematics essentially involves interaction with the world outside one's head. This is to be meant not only in the sense that several mathematical problems have an extra-mathematical origin, several mathematical concepts are formulated to deal with extra-mathematical questions, and several mathematical theories are developed to meet with extra-mathematical needs and are evaluated in terms of their capacity to meet those needs. It is to be meant also in the sense that the making of mathematics essentially involves representations located outside one's head. For example, much mathematics could not be done without using any symbolic or diagrammatic representation outside one's head. This is denied by supporters of the view that the method of mathematics is the abstract axiomatic method and mathematical practice should be based on that method. They claim that the use of symbolic or diagrammatic representations outside one's head is inessential, because mathematical truths can be deduced from given axioms, and deductions can be located entirely in one's head. But this claim is invalid. On the one hand, by Gödel's first incompleteness theorem, not all mathematical truths can be deduced from given axioms. On the other hand, generally deductions cannot be located entirely in one's head, because we are incapable of making even comparatively short deductions from given axioms without the help of symbolic or diagrammatic representations outside our head. Since the claim is invalid, one must account for the role in mathematics of representations located outside one's head. But the current theories of cognitive science do not have the conceptual tools to account for this role, and generally for the role in knowledge of representations located outside one's head.

Then, there is need for a new science that complements the current theories of cognitive science with a theory of representations located outside one's head. On account of its long-standing familiarity with the study of representations, philosophy could give an important contribution to the birth of this new science.

17. Conclusion

The present condition of philosophy has led to claim that philosophy has lost its bite, and is a relic of past glories because it is irrelevant to the advancement of knowledge. To overcome this condition of philosophy, the present view of philosophy must be replaced by a view of philosophy according to which philosophy is acquisition of knowledge, it can contribute to the advancement of knowledge in several manners, in particular by improving the methods of acquisition of knowledge, and can even lead to the birth of new sciences. This paper has given some suggestions as to how to implement this conception of philosophy.

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