From Mind to Matter:  
How Bergson Anticipated Quantum Ideas

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Abstract

In his book *Matter and Memory* of 1896, Bergson anticipated the quantum conception of matter: the idea that particles have a holistic nature, that matter is not substantial, that the movement and the position of a body cannot be determined simultaneously, and that physical processes do not obey a strict necessity. Surprisingly, he drew these conclusions from a reflection about the relation between mind and matter, in particular from his idea that perception is a relative coincidence of mind with matter, that a sensory quality is a mnesic synthesis of very brief moments, and that consciousness admits of degrees. This latter point leads to a panpsychism which is neither idealist nor physicalist.

1. Introduction

Feynman repeatedly claimed that nobody understands quantum mechanics (see, e.g., Feynman 1967, p. 129; Feynman 1985, p. 9), in the sense that quantum processes are very different from our perceptive and intuitive representations of physical processes, and a lot of physicists seem to think alike.\(^1\) In this article, I want to question this claim. Is it true that quantum processes are mysterious? A careful reading of Bergson seems to suggest the contrary.

The notion of “intuition” is certainly not clear. But for the moment, by this term I only mean what Feynman means when using it: a representation which is not scientifically built, that is, which does not arise out of from scientific research. Now it is interesting about Bergson that he seems to have anticipated the main quantum ideas about matter in his metaphysical research based on the “intuition” of the mind (Bergson 1934, pp. 18–25). The purpose of this article is to explain this in some detail.

Bergson introduces his ideas about matter in his second book, *Matter and Memory* (Bergson 1896). Thus, these ideas were published about

thirty years before the formulation of quantum mechanics by Schrödinger and Heisenberg (1925–1927). Some of these ideas are also described in *Introduction to Metaphysics* (Bergson 1903), *Creative Evolution* (Bergson 1907), *The Perception of Change* (Bergson 1911), and *Duration and Simultaneity* (Bergson 1922). Thus they are obviously recurrent in Bergson’s philosophy, and all these texts can be used to understand them.

First of all, I want to underline that Bergson is a realist in the sense that, according to him, a physical reality (that is to say a spatial and temporal reality, not a kind of Kantian thing-in-itself) exists independently of any mind – even if this reality is not perceived or conceived by the mind. Therefore, when I speak of a Bergsonian anticipation of quantum ideas, I do not allude to a reflection about the more or less objective existence of matter. I simply refer to a reflection about the nature of matter.

This implies that I propose a realist approach to quantum physics, an approach which does not question the independent existence of physical reality, its spatiality and its temporality, and which does not use the *ad hoc* idea of many worlds. There are of course other approaches. But the realist approach is the most natural one, and I believe that a careful investigation of Bergson’s writings may provide arguments in favor of this approach.

De Broglie (1947) and Capek (1969, 1971) already pointed out that there is a similarity between Bergson’s ideas about matter and the quantum theory. In this article, I wish to complete and refine some of their analyses. In the first part, I will delineate this similarity. In the second part, I will attempt to explain how Bergson used his theory of mind to propose a set of hypotheses about matter.

Besides, Antoniou and Christidis (2010) have recently shown that Bergson’s conception of time has a general mathematical expression which allows us to describe the irreversibility of physical processes, including quantum processes. At the end of section 2.4, I will return to this issue.

### 2. Four Quantum-Like Ideas in Bergson

Bergson holds a realist conception of matter. Thus, in chapter I of *Matter and Memory*, when he describes matter as a set of “images” (Bergson 1896, p. 17), he does not pretend that it is a set of psychological entities. He just means that matter is made of heterogeneous qualities, as

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2In 1924, de Broglie suggested the idea that an electron could be understood as a wave. In 1925, Heisenberg developed matrix mechanics for quantum processes. In 1926, inspired by de Broglie, Schrödinger developed wave mechanics for these processes, and demonstrated that this mechanics was formally identical to Heisenberg’s matrix mechanics. In 1927, Heisenberg formulated the indeterminacy principle. For more details see Jammer (1966, chap. 5).
our perception seems to suggest, and not of pure extension, as Descartes formulated it (Bergson 1896, pp. 9–11).³

By contrast, Bergson claims that absolute space and time do not exist in the sense that space and time have no independent reality outside of matter or mind. Matter is spatial but not “in space”, as we often say. It is temporal but not “in time”. In other words, space and time are some of the intrinsic features of matter, and not homogeneous containers for it (Bergson 1896, pp. 209–212, pp. 231–232). So the framework of our analyses is a realist conception of matter taken as being intrinsically spatial and temporal.

The four ideas I am referring to correspond, in Matter and Memory, to the propositions about matter in chapter IV, plus a remark in the conclusion of the book, in the following order: proposition III, proposition IV, propositions I and II combined, the remark in the conclusion.

2.1 Matter is Not a Set of Absolutely Distinct Elements; It Has Only a Degree of Division

Here are some formulations of this idea. Let us begin with Bergson (1896, pp. 196f):

*All division of matter into independent bodies with absolutely determined outlines is an artificial division.* ... *A moving continuity* is given to us, in which everything changes and yet remains: why then do we dissociate the two terms, permanence and change, and then represent permanence by *bodies* and change by *homogeneous movements* in space? This is no teaching of immediate intuition; but neither is it a demand of science, for the object of science is, on the contrary, to rediscover the natural articulations of a universe we have carved artificially.

And Bergson (1896, p. 245):

*That which is given, that which is real, is something intermediate between divided extension and pure inextension. It is what we have termed the *extensive.**

And, finally, Bergson (1907, p. 203):

*As to the second [point], we will limit ourselves to pointing out that perfect spatiality would consist in a perfect externality of parts in their relation to one another, that is to say in a complete reciprocal

³In Matter and Memory, Bergson uses the term “realism” in a narrow sense, to point out the Cartesian conception of matter, that is the reduction of matter to geometrical extension (Bergson 1896, pp. 25–28). But, according to Bergson (1896, pp. 9–11, p. 208), it is clear that matter exists even if it is not perceived or conceived by the mind.
independence. Now, there is no material point that does not act on every other material point. When we observe that a thing really is there where it acts, we shall be led to say (as Faraday was) that all the atoms interpenetrate and that each of them fills the world. On such a hypothesis, the atom or, more generally, the material point, becomes simply a view of the mind, a view which we come to take when we continue far enough the work (wholly relative to our faculty of acting) by which we subdivide matter into bodies. ... What else can this mean but that matter extends itself in space without being absolutely extended therein, and that in regarding matter as decomposable into isolated systems, in attributing to it quite distinct elements which change in relation to each other without changing themselves (which are “displaced”, shall we say, without being “altered”), in short, in conferring on matter the properties of pure space, we are transporting ourselves to the terminal point of the movement of which matter simply indicates the direction?

We commonly think that matter is made of distinct elements, of distinct bodies, each of them composed of distinct corpuscles. But according to Bergson, this view is partly false, in the sense that matter is not completely divided. It tends to be a set of distinct elements, but this tendency does not reach the extreme limit. Matter has only a degree of division. Bergson more often says that matter has only “a degree of extension” (Bergson 1896, p. 220, p. 247; Bergson 1907, pp. 201–203) because he thinks that “perfect spatiality would consist in a perfect externality of parts in their relation to one another” (Bergson 1907, p. 203). But this clearly means a degree of division.

He refers to the notion of a physical field to support his idea, in particular to Faraday and Kelvin. According to the former, matter is a set of elements whose lines of force are more or less interpenetrated. According to the latter, matter can be understood as a continuum in which vortices occur, producing a kind of division in the continuum (Bergson 1896, pp. 200–201; Bergson 1907, p. 203).

This implies that, according to Bergson (1896, p. 200), a physical field is a kind of matter, even if this matter is able to transmit forces. This implies also that, in Bergson’s view, a physical field cannot be understood as a set of absolutely distinct points, because this would mean that matter is completely divided.

Neither de Broglie (1947) nor Capek (1969, 1971) mention this idea: Capek understands that, according to Bergson, the concept of field is relevant to describe physical reality, but he omits to point out that, in Bergson’s view, the material continuum cannot be a set of contiguous points or parts (Capek 1971, pp. 262–263).4 From a Bergsonian point of

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4In Bergson’s view, it is unimportant whether the division is finite or not. In both cases matter is divisible into absolutely distinct parts. The idea that matter is infinitely
view, science is able to distinguish points in a field, each of them being associated with a specific value of force, because matter tends to be divided. But this tendency does not reach the extreme limit, which would be the division of purely geometrical space.

Now, if we turn to quantum physics, we also find the idea that matter is not divided into absolutely distinct parts. Physicists have good reasons to think that, under certain conditions, a single particle can have a much greater extension than a corpuscular extension, because it can behave like a wave. Otherwise, a lot of empirical facts are not understandable. But at the same time, they have good reasons to think that a single particle behaving like a wave remains an undivided reality, because when this particle interacts with another physical system, its wave extension can suddenly become a corpuscular extension. If not, a realist account would imply that the absolutely distinct parts of the quantum wave are able to move much faster than light to gather at a point. In this sense, Penrose says that a quantum wave has a “holistic nature” (Penrose 2004, pp. 511–515).

Besides, we know that several particles behaving like a wave can be entangled, in the sense that they can constitute a single wave, a single entity (Penrose 2004, pp. 578–580). However, even if we are not totally able to explain how and why, it seems that quantum entanglement is limited and that all the particles of the universe are not entangled at the same time (Penrose 2004, pp. 591–593). If this is true, these two points would lead to the conclusion that, globally, matter has only a degree of division.

2.2 Matter is Not a Set of Things, But a Set of Actions

Here are some formulations of this idea. A first version is due to Bergson (1896, p. 201f):

In truth, vortices and lines of force are never, to the mind of the physicist, more than convenient figures for illustrating his calculations. But philosophy is bound to ask why these symbols are more convenient than others and why they permit of further advance. ... Now the direction which they indicate is obvious; they show us, pervading concrete extensity, modifications, perturbations, changes of tension or of energy and nothing else. It is by this, above all, that they tend to unite with the purely psychological analysis of motion which we considered to begin with, an analysis which presented it to us not as a mere change of relation between objects to which it was, as it were, an accidental addition, but as a true and, in some way, independent reality. Neither science nor consciousness, then,
is opposed to this last proposition: Real movement is rather the transference of a state than of a thing.

And Bergson (1907, p. 248) writes:

But things and states are only views, taken by our mind, of becoming. There are no things, there are only actions.

Finally (Bergson 1911, p. 122ff):

There are changes, but there are underneath the change no things which change: change has no need of a support. There are movements, but there is no inert or invariable object which moves: movement does not imply a mobile. ... Let us come back, then, to the sense of sight. In further concentrating our attention upon it we perceive that even here movement does not demand a vehicle nor change a substance in the ordinary meaning of the world. A suggestion of this vision of material things already comes to us from physical science. The more it progresses the more it resolves matter into actions moving through space, into movements dashing back and forth in a constant vibration so that mobility becomes reality itself. No doubt science begins by assigning a support to this mobility. But as it advances, the support recedes; masses are pulverized into molecules, molecules into atoms, atoms into electrons or corpuscles: finally, the support assigned to movement appears merely as a convenient schema – a simple concession on the part of the scholar to the habits of our visual imagination.

We commonly think that a material body is made of things, that is of substantial corpuscles – corpuscles which are intrinsically invariable even if their position may vary. But, according to Bergson, this conception of matter is false; a material body is made of actions. Two points must be explained to understand this.

Firstly, Bergson thinks that a body, even a corpuscle, is nothing more than a set of qualities (Bergson 1896, p. 19; Bergson 1907, p. 302). In other words, a body is not a spatial entity which would possess some qualities, and which would be distinct from them; it is just a set of qualities spatially gathered.

Secondly, he thinks that every quality is a succession of very brief actions, that is of very brief productions of instable states (Bergson 1896, pp. 205–209; Bergson 1907, pp. 300–302). He adds that a quality may seem invariable if the successive actions are the same, or almost the same. But this invariability is not real, it is just an appearance.

Take the example of color. For a while, the color of a body may seem invariable. In fact, even in this case, the color is a succession of very brief actions, here of very brief light vibrations – 400 trillion vibrations for one second of red color. These vibrations are too brief to be distinctly grasped
by human consciousness, and if they are identical, we perceive a quality which is apparently invariable (Bergson 1896, pp. 205f).

According to Bergson, this analysis applies to every material quality and not only to light. It means that what we call a “material particle” is one or several qualities, each of them being a succession of vibrations or oscillations (Bergson 1911, pp. 123f). While de Broglie does not mention this idea, Capek (1971, pp. 265–267) does.

In quantum physics, we also find a non-substantial conception of matter. Accordingly, matter is not regarded to be made of substantial parts because, in some conditions, particles can be created or annihilated. For example, a particle and its antiparticle can be created out of energy or they can be annihilated by producing energy (Penrose 2004, pp. 609–612). Moreover, every particle “seems to be a periodic thing” (Penrose 2004, p. 500), like a wave, with a frequency and a wavelength.

2.3 Every Movement Is an Undivided Whole

Here are three formulations of this idea, the first one due to Bergson (1896, p. 188):

*Every movement, inasmuch as it is a passage from rest to rest, is absolutely indivisible.* This is not a hypothesis, but a fact, generally masked by a hypothesis.

Bergson (1903, p. 152):

Let us consider, for example, the variability nearest to homogeneity, movement in space. For the whole length of this movement I can imagine possible halts: they are what I call the positions of the mobile or the points through which the mobile passes. But with the positions, were they infinite in number, I shall not make movement. They are not parts of the movement; they are so many views taken of it; they are, we say, only halt suppositions. Never is the mobile really in any of these points; the most one can say is that it passes through them. But the passing, which is a movement, has nothing in common with a halt, which is immobility. A movement could not alight on an immobility for it would then coincide with it, which would be contradictory. The points are not in the movement as parts, nor even under the movement as places of the mobile. They are simply projected by us beneath the movement like so many

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5Sometimes Bergson speaks of a material quality as a succession of “movements” (Bergson 1896, p. 203; Bergson 1907, pp. 301f). At other times he speaks of it as a succession of “vibrations” (Bergson 1896, pp. 204f), of “oscillations” (Bergson 1907, p. 301), of “changes” (Bergson 1896, p. 209), of “events” (Bergson 1907, p. 301). It is clear that, according to him, the term “movement” here does not mean the change of the location of a body. It stands for “vibration”, “oscillation”, etc. Therefore, it means something like the production of an unstable state.
places where, if it should stop, would be a mobile which by hypothesis does not stop. They are not, therefore, properly speaking, positions, but suppositions, views or mental viewpoints.

And Bergson (1911, pp. 118f):

_We shall think of all change, all movement, as being absolutely indivisible._ ... It is always by a single bound that a passing is completed, when there is no break in the passage. The bound may last a few seconds, or days, months, years: it matters little. The moment it is one single bound, it is indecomposable.

In many text passages, Bergson holds the following view: The movement of a body is not a succession of positions, corresponding to immobilities. It is not made of positions. When a body is moving, it has no position, ever. In others words, the movement of a body is “a solid and undivided whole” (Bergson 1896, p. 189).

De Broglie (1947, pp. 52–56) underlines the analogy of this idea with Heisenberg’s “uncertainty principle”: Heisenberg says that “it is impossible to know at the same time with precision the dynamic aspect of elementary processes and their spatial localization” (p. 53). Similarly, Bergson says that if a body is moving, it cannot have a position. However, because of a questionable interpretation of the “uncertainty principle”, de Broglie does not take into account all the characteristics of this analogy. (Note that Capek (1971, pp. 295f) does not complete de Broglie’s analysis.)

Firstly, physicists have good reasons to think that the “uncertainty principle” actually concerns physical reality, and not only our knowledge of this reality. From this point of view, we can say that an elementary physical entity never has a perfectly defined momentum and a perfectly defined position at the same time (Wichmann 1971, Secs. 1.23–1.24). Therefore, the analogy with Bergson is stronger than de Broglie claims, in the sense that the “uncertainty principle” and what Bergson holds about movement and position both concern physical reality.

Secondly, from this point of view, the “uncertainty principle” could be understood as meaning that, for a particle, there is an intrinsic difference between a momentum state and a position state. A momentum state corresponds to wave behavior, whereas a position state corresponds to corpuscle behavior (Wichmann 1971, Sec. 6.5; Penrose 2004, pp. 523f). Now, we also find in Bergson’s work the idea that, for a body, there is an intrinsic difference between movement and position. According to him, there are absolute movements without absolute space (Bergson 1896, pp. 193-196). Therefore an absolute movement is not only “a change of place” (p. 194), it is also “a change of state or of quality” (p. 196).

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6This idea may seem quite strange. But in a reflection about Mach’s principle, Sklar (1974, pp. 229–231) supports it for accelerated movements.
Consider the double-slit experiment conducted with individual particles. In this experiment, if we do not determine the position of the particle when it passes through the double-slit, the particle behaves like a wave. But if we do determine the position, the wave behavior disappears. I think that Bergson would not have been surprised by this experiment. He would have said that determining the position of the particle amounts to creating this position, which did not exist before, and to ending the movement. So we no longer have one single movement, but two (from the starting point to the intermediate position, then from this position to the final one on the screen), and we introduced a qualitative change in the process.

As de Broglie (1947, pp. 53f) notes, it is true that Bergson seems to keep the idea that a movement between two points describes a trajectory. But when Bergson argues about movement, he has in mind macrophysical bodies. So his idea that, generally speaking, the movement of a body is not a succession of positions is remarkable enough.  

\subsection*{2.4 Material Changes are Characterized by a Minimal Degree of Contingency}

Here are two formulations of this idea, the first one due to Bergson (1896, p. 248):

Absolute necessity would be represented by a perfect equivalence of the successive moments of duration, each-to-each. Is it so with the duration of the material universe? Can each moment be mathematically deduced from the preceding moment? We have throughout this work, and for the convenience of study, supposed that it was really so; and such is, in fact, the distance between the rhythm of our duration and that of the flow of things, that the contingency of the course of nature, so profoundly studied in recent philosophy, must, for us, be practically equivalent to necessity. So let us keep to our hypothesis, though it might have to be attenuated.

And the second due to Bergson (1907, p. 218):

And yet there is an order approximately mathematical immanent in matter, an objective order, which our science approaches in proportion to its progress. For if matter is a relaxation of the inextensive into the extensive and, thereby, of liberty into necessity, it does not indeed wholly coincide with pure homogeneous space, yet is constituted by the movement which leads to space, and is therefore on

\footnote{In the foreword to de Broglie’s (1955) \textit{Physics and Microphysics}, Einstein writes that the analyses about Bergson and the new quantum concepts are “highly fascinating” (de Broglie 1955, p. 7). A complete English translation of de Broglie’s chapter about Bergson is contained in the anthology \textit{Bergson and the Evolution of Physics} (ed. by P. Gunter).}
the way to geometry. It is true that laws of mathematical form will
never apply to it completely. For that, it would have to be pure
space and step out of duration.

According to Bergson, physical reality, even the simple inert matter,
is characterized by a minimal degree of contingency.\textsuperscript{8} This idea is not
one of the four propositions about matter in chapter IV of Matter and
Memory, because this book does not aim to develop a complete theory of
matter. But in its conclusion, Bergson insists that \textit{the necessity hypothesis
for material processes must be “attenuated”}. And he alludes to the French
philosopher Boutroux (1895, p. 26–28) who clearly defends the hypothesis
of a minimal contingency for material processes.

Besides, in Creative Evolution, several passages explain that the real
order of physical processes is not completely mathematical, that is to say
not completely necessary (Bergson 1907, pp. 213–220). In this sense, Berg-
sen writes that mathematical necessity is just an “ideal limit” (p. 225),
and not a reality.

Now, if we turn to quantum physics, we also find the idea that there is
at least an apparent degree of contingency of physical processes, because
these processes just obey probabilistic laws. And the majority of physicists
seem to think that this contingency is not a simple appearance caused by
our ignorance, but that it belongs intrinsically to physical reality. Both de
Broglie and Capek note that Bergson anticipates this scientific discovery
(de Broglie 1947, pp. 56f; Capek 1971, pp. 284–290).

This analysis agrees with what Antoniou and Christidis (2010) write
about Bergson’s conception of time. The contingency of physical time is
nothing else than its indeterministic nature, the consequences of which are
unpredictability and irreversibility.\textsuperscript{9} If there is a degree of contingency in
physical processes, the result of the reversal of the direction of time is not
necessarily the reversal of these processes. Besides, the non-mechanistic
conception of physical changes, introduced in section 2.2, already tends
to undermine the idea that these changes would be reversible.

That said, when Bergson speaks of time in terms of “invention”, “cre-
ation of forms”, “elaboration of the absolute new” (Bergson 1907, p. 11,
pp. 27–31), this applies to life and to the universe as a whole, not to phys-
ical systems. In the work of Prigogine, to which Antoniou and Christidis
(2010) refer, the basic idea is to unify the descriptions of biological and
physical processes (Prigogine 1980, pp. 120–123; Prigogine 1984, pp. 174–
176), but this idea is opposed to Bergson’s conception of life (Bergson

\textsuperscript{8}A physical event E is “contingent” if it may happen or not in a certain physical
situation P. In other words, E is “contingent” if P can produce something else than E, for example E’.

\textsuperscript{9}However, to my knowledge, Bergson says nothing about the use of probability
theory, maybe because his work is more metaphysical than epistemological.
In this conception, from a cosmological point of view, life does not come from inert matter. The two appear together (Bergson 1907, pp. 247–251).

3. From the Mind-Matter Problem to Quantum Ideas

According to the preceding section, Bergson indeed seems to have anticipated some main quantum ideas. Now, the question is to understand how he did it. In this part, I will show that, for Bergson, these ideas mainly come from a reflection about the relation between mind and matter. In short, the general pattern of reasoning is the following:

1. The intuition of mind tells us what the nature of mind is.
2. But mind is in relation to matter by perception and action.
3. Therefore, what we know about the nature of mind must tell us something about the nature of matter.

This explains why, in the last chapter of Matter and Memory, when it comes to “the union of soul and body” (Bergson 1896, p. 180), Bergson develops a long passage about matter (pp. 188-218).

Does all this mean that, in Bergson’s view, philosophy can know what matter is without science? Absolutely not. According to Bergson, the complete philosophical method is made up of two parts: the intuition of mind (that is the “perception” of mind in all its aspects) and the control of science. In this sense he writes (Bergson 1934, pp. 50f): “Let me repeat, what I wanted was a philosophy which would submit to the control of science and which in turn could enable science to progress”. So contrary to a widespread belief, his method is not anti-scientific. The fact is just that, in the case of matter, the control of science has happened after Bergson’s death.11

I will now examine Bergson’s four basic arguments on matter. Within the limits of this article, I will try to explain his original way of thinking more than make a critical assessment of it.

3.1 Perception is a Relative Coincidence of Mind With Matter

We have a practical interest in distinguishing bodies. In particular, because the original function of our intelligence is to make and use instruments, we spontaneously tend to distinguish the parts of matter we can compose and decompose (Bergson 1907, pp. 140, 154). Thus, “of the

10 I do not claim that Prigogine’s project is illusory. I just recall precisely what Bergson thinks.
11 In the 1930s, Bergson never developed a systematic comparison between his ideas and the new quantum mechanics. He just made a few remarks (Bergson 1934, pp. 55f, p. 220 note).
discontinuous alone does the intellect form a clear idea” (p. 154). But, according to Bergson, there is no proof that nature must be clear to our intellect, and that the division of matter, which is real, is also absolute. Firstly, what is immediately given to visual perception is not a set of distinct bodies, but a continuity of colors (Bergson 1896, p. 197; Bergson 1922, p. 38). Secondly, a reflection about the nature of perception leads to the idea that matter is not absolutely divided. Bergson (1896) argues as follows:

1. Perception, in its concrete form, is a synthesis of pure memory and pure perception. On the one hand, “there is no perception which is not full of memories” (p. 33). But on the other hand, perception cannot be reduced to memory. Therefore, in its concrete form, it is a mix of pure memory and pure perception (pp. 33f).

2. Pure perception is a coincidence of mind with the reality perceived (pp. 35–38, pp. 64–65). Thus, when we perceive a part of the world, our mind has a certain extension (pp. 181f). Firstly, this is our spontaneous impression: “We all of us began by believing that we grasped the very object, that we perceived it in itself and not in us” (p. 43). Secondly, thinking that our perception would be situated in our brain, or nowhere, is very doubtful. No one has ever seen a perception in the brain. And extensity is the most salient quality of perception (p. 212, p. 245).

3. Because of this mind-matter coincidence, we can conclude that the extension of matter is not radically different from the extension of mind (p. 182).

4. But the extension of mind is never absolute, even in pure perception. In other words, the perceiving mind has only a degree of extension, that is of division.

5. Therefore the extension of matter, with which the perceiving mind coincides, must not be absolute, and we can make the hypothesis that it has only a degree of division: “Material extensity is not, cannot any longer be, that composite extensity which is considered in geometry; it indeed resembles rather the undivided extension of our own representation” (p. 182).

Point (2) is the most problematic one among those five issues. One may object that perception is often illusory – for example, we think that we see somebody we know, but in fact this person is someone else –, which proves that it cannot be a coincidence of mind with the reality perceived. But Bergson can explain this with the idea that lived perception is a mix of pure memory and pure perception; the pure memory part of lived perception may be poorly adapted to the situation. Besides, this part is always more or less suitable. In this sense, lived perception is just a relative coincidence of mind with matter.
One may admit that lived perception is a mix of pure memory and pure perception, and say (A) that this mix is located in the brain or (B) that it has absolutely no extension. But according to Bergson, both of these conceptions are ill-founded.

Consider conception (A) and the example of the lived perception of a landscape. This perception appears spatially and qualitatively very different from a brain (perceived thanks to modern technical equipment) which would be in the process of perceiving this landscape. Consequently, if this perception is literally in the brain, this implies that the brain is not as it appears to us, or that perception is not as it appears to us. In other words, it implies (A') that a real brain is very different from a perceived brain, spatially and qualitatively, or (A'') that a real perception is very different from a lived perception, spatially and qualitatively. But (A') implies that the scientific representation of the brain is an illusion (Bergson 1896, pp. 22–23). Therefore, speaking of something “in the brain” has no clear meaning. And (A'') cannot be a solution because even if “real perception” is an activity of some parts of the brain, the question remains to know where ‘lived perception’ (the image of the landscape) is located.

Now, consider conception (B). According to Bergson, this view is opposed to appearances: the data of sight and touch are obviously extended (Bergson 1896, pp. 196–197), and the data of the other senses “share in extensity, though in different degrees” (p. 212). For example, our immediate impression is that the sounds we hear are somewhere around our body, or that the taste of food is in our mouth. Moreover, thinking that perception has no extension (which is Descartes’ view) can hardly be interesting for physicalism, because it implies that a physical reality may have no extension. In other words, it tends to obscure the concept of “physical reality”.

Thus Bergson’s conception aims at saving all appearances: a real brain is similar to a perceived brain; and a “real perception”\(^\text{12}\) is nothing more than a “lived perception”, with its extension. The consequence is that perception cannot be in the brain, even if it depends on it, because it happens when a brain’s activity is caused by the outside (including the body). Therefore, perception must be a relative coincidence of mind with matter (with the parts of matter which act on our brain), and extension must admit of degrees.

The idea that something may be more or less extended, that is divided, may seem strange to us – hence Descartes’ view, which opposes a perfectly undivided mind to a perfectly divided matter (Bergson 1896, p. 220). But according to Bergson, this idea is not shocking for our intu-

\(^{12}\)Note that this does not mean that we are conscious of all aspects of our lived perceptions.
However, Bergson has to face another objection. We know that our perception is always an image of the past of matter, not of its present. For example, we know that the perception of distant stars is an image of their pasts, and we can deduce that this is the case for all perceptions, more or less, because of the distance between our brain and the perceived object. Therefore, how could perception be a coincidence of mind with matter?

To my knowledge, Bergson does not answer this question directly. But according to him, the past of everything is preserved; it continues to exist during the present, without any support. Firstly, due to our memory, we know that at least a part of our past is preserved, and that this past cannot be in our brain, for the same reason that our perceptions cannot be in our brain. Secondly, the mathematical present is nothing, which implies that the real present is not radically separate from the past (Bergson 1896, p. 150). Finally, in order to explain the preservation of material objects over time, we must admit that these objects have a “continuity of existence”, which means that their present is not radically separate from their pasts (p. 149). So Bergson’s indirect answer is that perception is a relative coincidence of mind with the past of some material processes.

3.2 A Sensory Quality is a Mnesic Synthesis of Very Brief Perceptions

Physics demonstrates that very little bodies (corpuscles) tend to be preserved over time. Thus we may believe that matter is nothing else than a set of indestructible and immutable corpuscles, which is the atomist hypothesis. But according to Bergson, there is no proof that we are right to go to this extreme. First, what is immediately given to our perception is not a set of invariables things, but a set of changing qualities (Bergson 1896, p. 197). Moreover, in order to obtain a satisfactory theory of perception, we must think differently. Bergson’s (1896) arguments are the following.

1. Two ideas are common in philosophy. The first one is that we perceive qualities, for example colors, sounds, etc. The second one is that these qualities are only mental states, and that what corresponds to them in the physical world are only movements we can

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13 Nowadays, some physicists conclude that spatiality of matter is not real because of quantum entanglement. I think that they make the same mistake as Descartes, omitting to consider the hypothesis that division may admit of degrees.

14 Note that Huemer (2001, pp. 131–135) comes to the same conclusion, supporting a theory of perception similar to Bergson’s.
quantify (p. 202). For example, what correspond to colors in the physical world would be the oscillations of an electromagnetic field.

2. These two ideas are not contradictory. So, a priori, they both can be true.

3. However, the second one is opposed to the intuitive conception of perception as coincidence (p. 202), which is also the conception of common sense (p. 10).

4. Therefore we can make the hypothesis that, in the physical world, there are material qualities which are similar to sensory qualities, and that the difference between them is about time. More precisely, the hypothesis is that a sensory quality involves an effort of memory which prolongs one into another over a plurality of moments. It is the (unconscious) mnesic synthesis of very brief successive pure perceptions, each of which is conceived as a coincidence with a qualitative material action. For example, the sensation of the color red for one second would be the mnesic synthesis of the perceptions of 400 trillion vibrations conceived as qualitative (and not as pure movements) and somewhat similar to the color red. This hypothesis would explain why science demonstrates that a sensory quality corresponds to a physical quantity (pp. 202–209).

5. At first sight it is problematic to think that matter is a succession of very brief actions because this idea seems unable to explain its tendency to be preserved over time – and the atomist hypothesis seems preferable. But we can put forward a temporal continuity. Intuition shows that mind is a process, a continuous flow, even if this process has relatively distinct moments. We can make the same hypothesis for matter: “Matter thus resolves itself into numberless vibrations, all linked together in uninterrupted continuity, all bound up with each other, and traveling in every direction like shivers through an immense body” (p. 208).

6. Therefore matter must be a set of processes, each of them being a succession of very brief actions.

Among these points, let me focus on point (4), that is the idea that our sensory qualities have a certain objectivity. One may object that the sensory qualities caused by an object are not the same for different subjects – e.g., I can see an object as red when someone else will see it as orange or green (if he or she is color-blind) – and conclude that they have no objectivity. But the Bergsonian conception of perception can answer this objection.

Firstly, it may happen that some parts of matter cannot act on the brain because of the nature of sense organs, or because of some lesions of

\[^{15}\text{Bergson (1896, p. 203) seems to think that there is a difference of intensity between the sensory color and the physical vibration which corresponds to it.} \]
these organs. The consequence is that these parts of matter cannot be perceived, which does not imply that they have no objective existence. In the case of colors, for example, it is clear that normal perception grasps more parts or aspects of matter than color-blind perception, because its ability to distinguish different colors is better. In this sense, every perception is a selection (Bergson 1896, pp. 35–39), and the more we are able to distinguish different sensory qualities, the more our perception is objective, that is to say complete.

Secondly, if “there is no perception which is not full of memories” (Bergson 1896, p. 33), this implies that our (lived) perceptions are never pure and that they must always be more or less different. They are slightly different when memories are controlled, that is when we are healthy and alert, and they are very different when the memories which penetrate perception are uncontrolled, in the case of hallucination (Bergson 1896, pp. 172–175).

Another objection is that physics describes matter without reference to sensory qualities. From this, some people conclude that matter is objectively a set of masses, charges, fields, movements, etc., but not of colors, sounds, smells, etc.

A first answer is that physics itself admits that there are material qualities which are neither extension nor movement, for example mass, charge, forces, etc. If not, it would be impossible to distinguish mass (which is extended) from electric charge (which is also extended), or gravitational fields from electromagnetic fields. One can always speak of these qualities as “primary qualities”, because they can be quantified. But physics cannot measure them directly, only by the effects they produce. Besides, is there a necessary implication from being an objective quality to being a quantified quality? And can we not think that science is always able to find a way, more or less artificial, to quantify something?

A second answer, developed in Bergson’s work, is that sensory qualities can exist without being described by physics because physical processes are very homogeneous, which allows a purely mathematical approach (Bergson 1896, pp. 204–205). For example, red is not blue, but these sensory qualities both correspond to the vibrations of an electromagnetic wave. Thus, in order to make an objective comparison, physics can neglect the specific quality of the vibrations and only consider their frequencies. Note that Eddington (1939, p. 150) holds a similar view, thinking that physics is “structural knowledge” of reality.

According to Bergson, we can add that rejecting the slightest objectivity of sensory qualities leads to the idea that there is a “pre-established harmony” between two realms: on the one hand, sensory qualities; on the other hand, physical qualities and movements. Between them, there is a miraculous translation (Bergson 1896, p. 205).
3.3 A Reply to Zeno

There is another assertion that does not emerge directly from a reflection about the relation between mind and matter. Its main inspiration is the consideration of Zeno’s paradoxes.\(^\text{16}\) In *Matter and Memory*, Bergson reasons as follows.

1. Zeno argues that movement is a succession of positions. Thus in the “arrow paradox”, he claims that, at any given instant, an arrow in flight is always at rest. And in the “Achilles paradox” he considers that movement between two stops is infinitely divisible into smaller movements, that is to say contains as many rests as we want (Bergson 1896, pp. 191–193).

2. Logically, he concludes that movement is impossible.


4. Moreover, movement between two stops is perceived as an indivisible process. If we believe the opposite, it is because we mistake “the data of the senses” for “the work of our imagination” which mixes up the movement and its spatial trajectory (Bergson 1896, pp. 188f).

5. Therefore we can make the hypothesis that movements are real and indivisible, and that Zeno’s presupposition is wrong (Bergson 1896, pp. 191–193). The movement of a body between two stops must be “a solid and undivided whole” (p. 189).

In *Time and Free Will*, Bergson already holds that movement is an indivisible process, but he thinks that this process is only psychological (a perception), and not physical (Bergson 1889, pp. 110–112).\(^\text{17}\) Obviously, this idea does not refute Zeno who argues that movement is just an appearance.

But thanks to *Time and Free Will*, Bergson knows that our mind is an indivisible process, even if our intelligence can hardly grasp this fact (Bergson 1889, pp. 98–110). So he has a model for understanding other realities (Bergson 1903, pp. 158f). Therefore, I think that the intuition of mind plays a role in the idea that movements are real and indivisible.

Finally, within the limits of this article, I cannot enter the debate about the different replies to Zeno by Russell, Black, Thomson, and others. But I want to note that, among the experts on this issue, there is no consensus regarding the idea that the best reply to Zeno would be purely mathematical (Salmon 2001). To me this means that Bergson’s reply is fruitful as regards its quantum style, and also intrinsically solid.

\(^{16}\)These paradoxes play a very important role in Bergson’s philosophy. They are dealt with in a lot of his books (Bergson 1889, pp. 112–115; Bergson 1896, pp. 191–193; Bergson 1907, pp. 308–311; Bergson 1911, pp. 120–121).

\(^{17}\)At the end of *Time and Free Will*, Bergson admits that this view is problematic (Bergson 1889, pp. 209–210, pp. 226–227).
3.4 Consciousness Admits of Degrees: Bergson’s Panpsychism

Physics manages to discover laws of nature. Encouraged by this success, we may believe that the future of matter is totally prefigured in its present, like a theorem is totally prefigured in some axioms. But there is no proof that we are right to go to this extreme. Besides, according to Bergson, we have good reasons to hold a panpsychist conception of matter. The idea that matter has a “continuity of existence” already leads to the idea that it has a kind of memory (Bergson 1896, pp. 202–203; Bergson 1922, pp. 47–49). Moreover, Bergson reasons as follows:

1. We experience the psychical prefiguring of some of our actions, that is the fact that a flow of representations precedes and determines the way we act. This means that, before all philosophical discussion about the mind-body problem, we believe that our representations can cause some of our actions.

2. But closer attention shows that this experience is diverse, in the sense that our actions are more or less consciously determined. More precisely, we experience that the less our actions are consciously determined, the more they are immediate and stereotyped, like reflexes (Bergson 1896, pp. 150–155, 166–169).

3. Therefore we can conclude that consciousness admits of degrees (Bergson 1896, pp. 155, 168f).

4. Moreover, we can make the hypothesis that, in nature, very high and very low degrees of consciousness than the ones we experience may exist. In other words, we can make the hypothesis that, in nature, the human spectrum of degrees of consciousness is just a part of a more important spectrum (Bergson 1896, pp. 221–222).

5. Now, logically, if there are very low degrees of consciousness in nature, these degrees must be associated with very immediate and stereotyped actions. Some living beings act in this way, like bacteria, but inert matter, too. If the physical conditions surrounding an inert system change, this system immediately reacts and always in the same way; it does not hesitate, and with the help of previous observations, its reaction is easy to predict.

6. Consequently, our hypothesis leads to the idea that a minimal degree of consciousness may be associated to inert matter: “Thus, between brute matter and the mind most capable of reflection there are all possible intensities of memory or, what comes to the same thing, all the degrees of freedom. ... We may go further: memory does not intervene as a function of which matter has no presentiment and which it does not imitate in its own way” (Bergson 1896, p. 222).

\[^{18}\text{We must not conclude too quickly, however, that the simplest living systems are the less conscious.}\]
7. Consequently, this leads to the idea that material changes may be characterized by a minimal degree of contingency (Bergson 1896, pp. 244, 248).

Obviously, many questions may be raised as regards this reasoning. Concerning point (1), one can ask the classic question of how we know if psycho-physical causation is possible. Surely, this kind of causation is logically possible, i.e. non-contradictory. I add that it is “metaphysically” possible, in the sense that there is no other reason than induction to think that every causation must be like causation in physics (Averill and Keating 1981, pp. 102-107).

Besides, Bergson’s argument could shed light on the nature of causation for inert matter. When an electron is in a force field (cause), it accelerates (effect), and physics says that a force acts upon it. But what is a “force”? According to classical physics, it is something which, at every point of a field, has direction and intensity. It implies that all the points of a field are not necessarily the same and that they differ because of non-extended properties. Moreover, when a force acts, it obeys some laws, as if it was constrained by a kind of information. Now, if a “force” has non-extended properties able to act upon a body, according to some information, there is no denying that it is something which is similar to mind as it appears to us.\footnote{I do not pretend here to make a detailed hypothesis about causation for inert matter. I just want to stress the fact that we cannot make a metaphysical hypothesis about causation without understanding what a “force” is, and that, in classical physics, this concept is stranger than we commonly think.}

Concerning (5) and (6), one can wonder whether something – a bacterium for example, or an atom – can possess a degree of consciousness without having a brain. Bergson answers this question in the following way: Rejecting consciousness for an animal because it has no brain is as absurd as rejecting its ability to feed because it has no stomach. A bacterium feeds without stomach, in its own way (Bergson 1907, p. 110). In other words, thinking that consciousness requires a brain, more generally a very complex physical system, because this is what we observe for human beings, is just an induction, and a bad one. This induction omits to consider that consciousness admits of degrees, and that it only needs a “center of actions” to act.\footnote{In Matter and Memory, the general concept of “center of actions” includes the specific concept of a human brain (Bergson 1896, pp. 20, 31).} In a bacterium, something must be this or these center(s) of actions: its nucleoid, its chemoreceptors. And as regards inert matter, a particle may be a center of actions.
4. Conclusions

Bergson’s anticipation of quantum ideas leads to the conclusion that these ideas are not opposed to intuition. What we immediately perceive is not a set of substantial things but a set of changing qualities, whose movements are indivisible. What we experience about our perceptions and actions allows us to think that matter has only a degree of division, and that it may be characterized by a minimal degree of contingency. These ideas are only opposed to a purely intellectual representation of matter, which is interested in what is substantial, discontinuous and regular. This kind of representation is very useful for man because matter tends to present these features – but it is only a tendency.

Moreover, the idea that matter has only a degree of division is a good reason to maintain a realist approach to quantum physics. It is not because the quantum wave has a holistic nature that matter has no spatiality (like the Kantian thing-in-itself). Finally, the fact that Bergson anticipated crucial quantum ideas from a reflection about the mind-matter relation shows that the Bergsonian theory of mind still deserves real interest.

Acknowledgments

I would like to thank one of the referees for constructive comments and suggestions which improved this paper.

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Received: 25 April 2012

Revised: 24 July 2012

Accepted: 26 July 2012

Reviewed by Pete Gunter and another, anonymous, referee.