

## **we bergsonians: the kyoto manifesto**

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### “WE BERGSONIANS...”

Of the philosophers working today, who deserves to be regarded as a true Bergsonian? Conferences and seminars devoted to “Bergson studies” may not be the best testing ground. When Aristotle paid tribute to his master in the famous section of the *Metaphysics* on the doctrine of forms (“We, Platonists...”), it was to develop his ideas in new directions. The result, as we all know, was a different philosophical system entirely. It would be astonishing if re-thinking the doctrines of *durée*, becoming and genuine novelty were not similarly capable of yielding new insights and pointing to new directions beyond Bergson’s work: not merely a *return* to Bergson, a *neo*-bergsonism, but a philosophy for our own times.

A philosophy, however, cannot be instituted by decree; it needs to be actually created. Now it may well be possible to be a Bergsonian despite Bergson, and—at least up to a point—against Bergson, but if the distinguishing trait of bergsonism is its methodology, we first need to ensure that this methodology continues to be of genuine use. We need to explore what this methodology can deliver today, with regard to the problems that *we* are currently confronted with. In this regard it is obvious that Bergson scholars aren’t themselves always very Bergsonian when it comes to the concrete forms of philosophical inquiry. As Gilson aptly put it: “The

true Bergsonians are not those who merely repeat Bergson's conclusions. Rather, they are those who—following his example—make these conclusions their own, and in different areas succeed in doing something analogous to what Bergson did.”<sup>1</sup>

We, Bergsonians, have read and re-read Bergson; we have studied the complex ways in which his philosophy has been received. We have defended him against his detractors; we have corrected misunderstandings, provided the overlooked context of his *oeuvre*, and felt the singularity and force of his theses, the subtlety of his way of thinking: demanding and “difficult,” as Bergson himself acknowledged, misleading in its apparent informality (“How on Earth did anyone miss that?”, he wonders). All this was necessary. But now is not the time to give a second youth to Bergson's “philosophie nouvelle.” Bergson is already amongst us, and he is not lacking in friends. The question we find ourselves confronted by is how best to harness the impetus of his philosophy, even if this involves directing it along new lines.

Bergsonism has been interpreted in various ways: the point is to change it and put it to work in the context which is manifestly very different from Bergson's own.

We are setting out the case for *an expanded bergsonism*.

## EXPANDED BERGSONISM

“Expanded” in what sense? First and foremost, our bergsonism must engage fully with the sciences of today. It is important to remember that Bergson himself was continuously stimulated and spurred on by the sciences of his time. His method risks amounting to no more than an idle play of concepts if it is confined to purely intra-philosophical issues. What is the point of reformulating the great metaphysical questions—determinism and contingency, matter and mind, monism etc.—in terms of *durée*? Metaphysics is never conducted in a vacuum, it is never purely *a priori*. Bergson insists that intuition is a form of reflection. But reflection on what? Invoking the distinctive character of lived experience is of little help if it is not in constant touch with the rich experiential content elaborated in the worlds of science and technology. Bergson wanted us to engage with the full-blown spectrum of experience—“integral experience,” as he calls it. Admittedly, scientific experience is essentially committed to a symbolic framing of the given, but it would be strange indeed to exclude from our inquiries such an essential part of our cogni-

tive activity, or to confine it to the margins of the “ordinary.”

The necessity of once again putting bergsonism into direct confrontation with the living sciences—science in the making—illustrates a more general requirement. What we need is not a new commentary, it is a new research programme: one adapted both to the problems of today and the constellation of questions that Bergsonians have traditionally focused on, but which permits deviation from methodological orthodoxy if and when the need arises.

To successfully carry out a project of this sort, a project which takes Bergson as its point of departure, it isn't necessary to speak his language—on occasion, it may even be preferable not to. To re-iterate: the task at hand is not to read or re-read Bergson, it's a matter of *translating* him. Translating Bergson requires us to escape the stranglehold of his own words. We need to assess how well his claims fare in new and different contexts and frameworks. This stress-testing will bring Bergson into contact with different philosophical traditions, with their own terminologies. Yes, we must continue to confront Bergson with phenomenology and analytic philosophy, method against method. We need to imagine—why not?—an analytic Bergson, a *philosophically* clean-shaven Bergson, as Deleuze said about Marx. Such experiments are not intended for the perverse pleasure of watching Bergson turn in his grave. The aim is to bring the distinctive features of a philosophical position into clear view, and so bring the relevant domains of research into proper perspective—while in each case isolating the critical connection between philosophy and the empirical sciences.<sup>2</sup>

There is an immediate advantage to adopting a *broader, expanded bergsonism*: those who find much to admire in Bergson, but who are unable to count themselves as his disciples, need no longer suffer from a guilty conscience. It is possible to be a Bergsonian without giving any thought to safeguarding an orthodoxy from its detractors. To extend one of his intuitions in a different direction, or find new avenues of attack, nothing forbids us from reconstructing his doctrines, or finding novel ways of recombining his concepts. Similarly, there is nothing to prevent our transforming or deepening his analyses by bringing them into contact with other philosophical programmes, provided they intersect Bergsonian thought by virtue of having certain problems in common. The expanded bergsonism advocated here will thus be a *refracted* bergsonism. This comes at a price. The risk is to run on occasions into dead-ends or blind alleys. It may turn out that we have been in pursuit of a mirage, a merely virtual bergsonism.<sup>3</sup> But this, perhaps, is the price

of all real experimentation. As Jacques Rancière put with regard to Deleuze: “The strength of every strong thought is also its ability to arrange its *aporia* itself, the point where it can no longer pass.”<sup>4</sup>

In the paragraphs which follow we outline the general shape of such an expanded bergsonism, while reviewing some of the issues it must confront, as well as the specific areas where we believe new research should be concentrated.

## A SPECULATIVE EMPIRICISM: FOLLOWING “LINES OF FACTS”

Let’s start by marking one vitally important point. Bergson subscribed, as is familiar, to a “true empiricism.” He spoke of a “positive metaphysics” in order to suggest that the philosophical elaboration of experience involves more than a merely verbal reference to the whole of experience. By contrast with speculative metaphysics, positive metaphysics develops in close—and critical—connection with the symbolic frameworks devised by those whose primary aim is precisely to come to terms with the facts.

The “immediate given” has sometimes been overlooked or misunderstood: there is no phenomenologically pure experience that can be taken as philosophically foundational. Even the most primitive forms of experience are compromised with forms of objectivity originating in our cognitive activity: the primary manifestations of “intelligence” are as much a given as the revelations expected from intuition. If it were not so, it would be impossible to understand why Bergson attempted to forge the critical tools he did *right from the start*. It is critical that we distinguish and disentangle space from *durée*, but we have no choice but to start with this state of entanglement. Bergson’s pure *durée* is not simply given; it requires effort, it must be conquered. We cannot do otherwise than starting from where we stand, in the midst of confusion. The “turn of experience” is a vanishing point, it will not yield “first principles” for our philosophical guidance. The philosophical method of intuition cannot be *a priori*, nor does it take the form of a transcendental structure in the classical sense.

This isn’t to say that that there is no philosophical grammar, and hence that Bergson’s spiritualist empiricism amounts to carrying out purely critical manoeuvres performed in the vicinity of the natural sciences. The grammar is there, but it is sometimes concealed, or only implicit, in the texts. It’s a *constructive* grammar, rather than one that is given, or deduced. It must be understood in relation to

a metaphysical imagination which, retrospectively, provides us with something akin to a sketch: a nascent vision elaborated in the guise of a schema for reality. It is only by resolving what is blurry in the picture or indeterminate in the schema that metaphysical precision will be attained. The only way metaphysics can escape metaphors and be taken literally is by assuming this figurative condition.<sup>5</sup> This is the source of the difficulty of Bergson's language, and all the ambiguity of his allegedly "imagistic" prose. An image, he writes, "isn't a mere ornament, it's a suggestion of representations which, in order to be fruitful, should suggest lines of research,"<sup>6</sup>. This is why several images are usually needed: if possible very different from one another, where these differences reveal the inadequacies any single image might possess. An image offers a line of sight, and in that respect it fulfils exactly the same role as the lines of facts. The latter too must work together—they only reveal their full significance when they end up intersecting with one another.<sup>7</sup>

Thus, phenomena which are at first sight as disparate as paramnesia (the sense of *déjà vu*), the "panoramic vision" of the dying, or the stubborn persistence of a "word at the tip of one's tongue," can all point to the existence of a single distinctive mode of being: an immemorial past that produces and conserves itself as reality is itself being made. The facts are not only "stubborn," as Lenin put it: they are above all disjointed and scattered. That is why we need to re-arrange them in accord with the "lines of facts." The difficulty is to demonstrate—via tentative exercises of trial and error, while always taking care not to lose sight of the heterogeneity of the given—to make these diverse lines of facts converge on the same intended target. If it were not supported by this patient work of focusing, the integral conservation of the past would remain nothing more than an obscure metaphor. In all cases it is necessary to view the question under consideration from multiple strategic vantage points: "Intuition isn't an inspiration that has dropped down from the heavens; it's an approach which involves leaping to the centre, after having taken sightings from all sides."<sup>8</sup>

#### ONTOLOGICAL COMMITMENT AND CRITICAL DISTANCE: THE CONNECTION WITH THE SCIENCES

If Bergson's thought has never transformed itself into a neo-bergsonism, a *spirit of bergsonism* has nonetheless had an impact on the entirety of contemporary French philosophy, from Canguilhem to Deleuze, passing through Simondon, Ruyer, Merleau-Ponty and Foucault, to mention only a few. Its distinctive features include

recognizing the importance that should be given to the lines of facts, and to the empirical sciences which provide us with a detailed understanding of them.

In this regard we must note two points that continue to be overlooked by the mainstream reception of Bergson's ideas.

Contrary to what has often been assumed, for Bergson scientific knowledge is not necessarily artificial, a mere play with abstract symbols. Science would not be as effective as it is if it did not carry ontological significance: in its own way, "science reaches the absolute." Even mathematics, in certain respects, "is by no means just a game, but a real point of contact with the absolute."<sup>9</sup> "I would like to know if there exists, among the contemporary conceptions of science, a theory which gives to the empirical sciences a higher status."<sup>10</sup>

As conceived by Bergson, intuition is not the perfectly precise instrument that it has sometimes been taken to be, a kind of laser beam by which we are able to penetrate through to the ground level of reality, where we directly apprehend becoming. Intuition provides the driving force, but left to itself its deliverances remain essentially vague. Intuition only becomes precise when its scope is focussed and tightened.<sup>11</sup> It needs, as we have just seen, to follow the lines of facts, and be transposed into symbolic-conceptual forms.<sup>12</sup>

There is also a practical necessity. In order to be communicated at all, intuition requires intelligence, it has to "ride on the back of ideas".<sup>13</sup> But Bergson takes a further step:

As soon as we have intuitively apprehended the truth, our intelligence corrects itself, and gives intellectual form to its error. Having received a hint, it provides in its turn control. As the divers will touch in the depths of the ocean the shipwreck that the aviator has spotted from high in the air, so our intelligence—immersed as it is in a conceptual environment—will analytically verify, point by point, what has been apprehended in a synthetic, supra-intellectual manner.<sup>14</sup>

And better:

The *intuition* that I have spoken of can only enter into play after one has studied, deepened, and often even expanded upon the empirical evidence

that positive science has gathered on a certain issue.<sup>15</sup>

Science can reach the absolute, and intuition has need of science, not only in order to be communicated and conveyed, but simply in order to function. For these two reasons, science is a good deal more than a domain in which the Bergsonian methodology can be applied. Above all, the role of science is not confined to that of the bogeyman that possesses only functional, “tool-making” intelligence, incapable of understanding life, that “spatializes” and distorts everything it touches. This picture is all too familiar in the textbook version of bergsonism, but it is utterly misguided. Science is not there simply as a foil that one would set up to promote a general critical methodology aimed at recovering the vital, pre-reflective aspects of reality. Rather science is the necessary precondition for the effectiveness of the method in question. Bergson’s engagement with science goes beyond both the hermeneutic mission of interpreting scientific works, and elucidating the ontologies implicit in scientific theorizing: philosophy, Bergson maintains, must “mould itself upon science”. But this intimacy indicates a true complementarity, rather than any subordination of one to the other. And this in turn presupposes that intuition introduces a *critical distance*—rather than a rift—with regard to the sciences, albeit in a very different manner than phenomenology or analytic philosophy.

This is arguably the most important feature of “intuition as method,” to follow in Deleuze’s steps. Intuition manifests itself initially by its capacity to refuse certain readymade intellectual schemas. Accordingly, the Bergsonian methodology includes a crucial analytical aspect, which is manifested in the dialectical manoeuvres aimed at identifying and eliminating inadequate concepts and erroneous syntheses. Science is concerned to the extent that it sometimes yields to misleading analogies and over-hasty generalizations. These can be prevented and corrected, with the aim of bringing into the open the inconsistencies of the (often unconscious) metaphysical assumptions underlying scientific discourse. The proper use of intuition, Bergson believes, will open new lines of questioning, and sometimes lead to factual discoveries which may in turn lead to the reform of certain habits of thought shared by working scientists. To sum up, philosophical interventionism is the price one must pay for acknowledging the ontological weight of scientific discourse. Our contention is that a bergsonism which had nothing to contribute to the improvement of science would not be worth an hour’s effort.<sup>16</sup>

That said, the proper role of intuition does not extend to supplying science with metaphysical “foundations”: science manages to function perfectly well without these. Nor does intuition aim at panoramic “conceptions of the world,” as if the task of philosophy was to supply science with broader and bolder syntheses, taking its theories to ever higher levels of generality along the same directions. This would condemn philosophy, which can only ever engage with the sciences as they are at a particular moment in time, to always lag behind on the path of scientific progress.

Bergson has thus tried to connect metaphysics with the sciences in an entirely new way. He started from the assumption that philosophical questions enjoy an autonomous existence—something that is always difficult to convey to scientists who are as likely to forge their own “philosophy” as they are to repudiate all philosophy as entirely useless. But by demanding further refinements, distinctions and differentiations, science invariably renders these same questions *more precise* than they would otherwise be.

I see in the metaphysics that is to come an empirical science of sorts, one that is cumulative, but also constrained—in the manner of other sciences—to treat the results to which its attentive study of the real has led it, as being only ever provisional.<sup>17</sup>

Given this, in which directions should our efforts be directed? What are the questions which should be occupying us today? Which lines of facts are ripe for philosophical scrutiny?

“Where will we be led? No one knows. No one can even tell us which science will uncover the new problems. It could even be a science with which we are today wholly unfamiliar.”<sup>18</sup>

## NEITHER REDUCTIONISM NOR EMERGENTISM

Let’s try a few guesses anyhow. By way of a concrete example, consider living organisms, or organizations. The real character of Bergsonian vitalism—often obscured by an overly strong fixation on the doctrine of the *élan*, or by an overly simplistic opposing of mechanism with finalism—has been rediscovered. From a critical perspective, the point to keep in view is that the Bergsonian approach provides an alternative to conceptions of nature that are either *reductively* physi-

calist and *emergentist* and *hierarchical* (with regard to both nature itself, and the relationships between nature and culture). Emergentism can be developed in terms of levels of reality, or levels of explanation (with higher-level properties “supervening” on more fundamental properties). From the Bergsonian perspective there is a plurality—no doubt irreducible—of modes of existence, but this plurality is not distributed in layers corresponding to increasing levels of complexity, crowned by the domain of consciousness; reality simply isn’t stratified in such a straightforward manner, because genuine complexity cannot be the product of a mechanistic combination of elemental bricks of reality. As Ruyer puts it, “the ‘new’ is being formed at each instant everywhere, but there are no superimposed layers ... each bringing its characteristic ‘novum’”.<sup>19</sup> (It goes without saying that bergsonism also rescues us from more sophisticated forms of reductionism or regionalism, such as Husserl’s philosophy of consciousness, or the ontological phenomenology of *Dasein*.)

The Bergsonian approach to the nature of life starts from the idea that we are always already immersed in entangled levels of *durée*, not (as Deleuze would have it) in a “plane of immanence,” nor even in a plurality of such planes, but rather in a *redoubling* of immanence. First of all because, as Frédéric Worms has noted, there really are *two* meanings of life.<sup>20</sup> Underlying the distinctive doctrines of *Creative Evolution* is a *cosmological turn* in Bergson’s thought, which accounts for the fact that to experience the immanence of *durée* it is necessary to be able—simultaneously—to experience the “*durée* that is immanent in the whole universe,” that is the cosmic consciousness to which our own consciousness is connected by innumerable links of sympathy. The paradigmatic example is the well-known “lump of sugar”: its melting participates in the absolute in *two* respects, because in addition to bringing lived duration in the focus of attentive awareness, it also bears the weight of the entire cosmic process. On the one hand, the melting is the living symbol of my own impatient waiting; on the other, my impatience is pitched against the whole spectrum of intertwined durations that make up my environment: I have no choice but to wait, and the lump of sugar is the living symbol of the unfolding universe.<sup>21</sup>

These redoublings make it possible for particular episodes of *durée* to constitute themselves, not only by enfolding or contracting more or less intense instances of duration (this is how Bergson accounts for our phenomenological *situation* within the world), but also, at the same time—and to different degrees—by extrapolation or projection into other episodes of *durée* which in turn encompass them

(this is the theme, less obvious but clearly present, of *perspective*, to which we will be returning). Bergson introduces fundamental distinctions which help us orient ourselves within this entangled domain governed by reciprocal causality: if we are considering things statically, the relevant distinction is between *the closed* and *the open*; from a dynamic perspective the relevant distinction is between *iterative repetition* and *creative repetition*.

We believe the entangled levels of *durée* are a fundamental characteristic of the living, one of the basic parameters determining biological organization. The concept of redoubled immanence takes a more explicit form in Simondon's work, with his claim that biological individuation should be construed as taking place in a "theatre" in which it plays the role of an "actor." The same intuition is at work in Bailly, Longo and Montévil, when they urge that we conceive of the transition from the physical to the biological in terms of an organism which lives and develops, repairs and reproduces itself in a *space of extended criticality* which exists in addition to the standard range of physical properties.<sup>22</sup>

## THE VIRTUAL AND THE POSSIBLE

From a Bergsonian perspective, the virtual is real, but the virtual is not simply the possible. Life and memory, to the extent that they are virtual and never cease virtualizing themselves, mean we must re-evaluate the character of the modal relationship between the possible and the actual, between *what is* and *what might be*. In other words, to take proper account of the nature of the virtuality which underpins real-world processes, we cannot consider what might be as simply a form of what is—and hence as something amenable to direct quantification and calculation.

Suppose, for example, that we take the states of a biological system to exist in space of possibilities which includes both the random and the probable. In so doing we would not be in a position to explain the radical novelty and unpredictability which, in reality, are characteristic of such a system. The evolution of life—and the same goes for human memory—creates at each instant *new possibilities*. Evolution acts on and alters, in real time, the space of possibilities which (supposedly) explains evolution itself. We are thus led to distinguish the concepts of what "is different" and what "might be," between what is simply *possible*, and what is *truly contingent*, and by nature unpredictable. These conceptual clarifications will no doubt have an impact in domains such as decision theory and the philosophy of

action.

## A BROADER LOGIC

Bergsonian ontology requires—as with Simondon, albeit in a somewhat different way—a broadening of logic. This broadening does not involve our putting into question the principle of non-contradiction, but it does require us to reject the *principle of the excluded middle*: *Not not-A* and *A* are no longer equivalent.

This brings us back to Bergson's views on the “two orders.” Matter is not merely negative, it is not the reverse image of life, it does possess a form of *durée*, different in nature from that of living things. On the one hand, the *durée* of matter is characterized simply and solely by repetition, whereas the *durée* of living things is characterized by invention, creation and self-overcoming (at least with respect to their purely material nature). But on the other hand, it remains the case that matter belongs to life, and is somehow folded within it. We here run into the issue of emergence once again. Is organization something which emerges from a primitive physical substrate, or is it the other way around? Isn't the physical best understood as the neutralisation or slowing down of the interactions that are characteristic of the biological realm? This provides us with a fine example of a non-conservative extension: to comprehend how the physical can go beyond its own order it is necessary also to understand that the alleged physical basis was itself the product of an idealization.

Similarly, for Canguilhem an illness isn't nothingness, but rather another mode of life—or (if one prefers) an illness is a deviant physiology, which also means it can't be reduced to the merely physiological. Inversely, life is a “dynamic polarity,” which means that life isn't simply the opposite of death, nor health the opposite of illness: rather there is a pathological dimension inherent in life itself—death is to be found within life and nowhere else.

Again, the issues are clearer and more explicit in Simondon. “To understand individuation,” he writes, “one needs to conceive of being not as substance or matter or form, but as a system that is under tension, oversaturated, that exists over and above the level of unity, which doesn't consist solely in and of itself, and which is therefore not constrained by the law of the excluded middle.”<sup>23</sup> Which amounts to saying that becoming itself is not nothing, or equivalently, that being isn't whole. Just as becoming has a mode of being, so too does being undergo becoming. Be-

ing, as Simondon points out, can be out of phase with itself.<sup>24</sup>

It is only by rejecting the excluded middle that we can hope to be in a position to understand how it can be that in the order of things, it is the virtual rather than the actual which comes first. If the virtual is *otherness*, the actual is that which is *other* than otherness.

## PRESENTISM AND ETERNALISM

It is from this basis that one should consider the critical relevance of Bergson to contemporary debates concerning the metaphysics of time. In the analytical world we find “presentists” and “eternalists” doing battle over the domain that should be given to the verb “to exist.” (Should it be confined to only the present? Or to the past as well, or perhaps even the future?) It is clear, however, that their disagreement rests on a presupposition that is common to both camps, but which passes largely unnoticed. It is being assumed, in effect, that the past and the present are fundamentally homogeneous in nature: that the past differs from the present only by virtue of *no longer being* present, and hence that the past and present have exactly the same *kind* of contents, which is apparent in the fact that, from the point of view of ontological calibration, they can only be differentiated from one another modally. Once this assumption is made, we still need to explain how the concepts of past and present nevertheless apply to successive states of affairs that do not differ in kind. Some appeal to a mysterious “passage” of time (which one can try to elucidate via the analysis of various “models” of the flux of consciousness).<sup>25</sup> Others appeal instead to perspectival notions compatible with the view that reality in itself is perspective-free (hence the frequent appeal to the indexical character of “now”: what counts now as “now” is dependent upon our contingent location along the timeline). If, however, one views the present and the past as fundamentally different *in kind*—as different, according to Bergson, as the actual and the virtual—then the metaphysical landscape is entirely transformed and the philosophy of time must be grounded on new ontological foundations. In order to achieve this, it is interesting to filter Bergsonian themes through the analytic instruments provided by current debates in the philosophy of time. The quarrels between “tensors” and “detensors,” proponents of A-time and B-time, should not be dismissed as moot. Even pseudo-problems can be of use when it comes to making Bergsonian ideas more precise. For it is not enough to gesture towards the virtual, or to claim that space-like models of time give up genuine becoming from the start. Gnomonic formulations will remain opaque no

matter how frequently they are repeated; such is the formidable claim that the past conserves itself integrally “in itself.” Here again, philosophical debates out new lines of facts, following, if need be, the latest developments in neuroscience.

## RE-EXAMINING THE RELATION BETWEEN DURATION AND SPACE

We said above that we shouldn’t hesitate to loosen the stranglehold of Bergson’s language and terminology. Let’s start with *durée*, bergsonism’s central concept. In the literature it has generally been reduced to nothing more than a qualitative or heterogeneous multiplicity, entirely lacking any numerical dimension. As established by several recent studies, this idea has had its day.<sup>26</sup> In fact, *durée* and number are not entirely foreign to one another: *durée* can be viewed as “an obscure number,” “a special number”; i.e. non-spatial in nature. This idea, if properly developed, would lead us to a qualitative arithmetic, one that is capable of describing physical phenomena without obliterating the temporal aspect inherent in their becoming. For, after all, what is measurement if not a way of coming to terms with the internal rhythms of change?

Among the other taboo words for Bergsonians, “spatialization” is not the least problematic. What is space? The critical role the category plays in Bergsonian thought is clear enough, and there’s no need to return to the relevant points here. But how do things stand with regard to the diverse plurality of spaces, both concrete and abstract, that are associated with the lives of humans and animals, as well as with scientific and artistic activities? Are there lines of facts here which might be of interest to philosophers? Bergson famously criticized the metaphysical assumptions behind the adoption of one particular kind of abstract space in connection with relativity theory: the four-dimensional Minkowski spacetime, with its characteristic pseudo-Euclidean signature. He took this construction to be simply an extension of the kind of geometrical representations of movement that are frequently to be found elsewhere, e.g. in the ordinary use of curves and graphs depicting change-over-time. Would he have had the same to say about configuration or phase spaces in other areas of contemporary physics? If the spatial mode of existence is indeed the ideal limit to which matter (qua extension) tends by its own nature, how should this metaphysical thesis be situated with respect to the diversity of geometrical constructions to be found in contemporary mathematics: not only  $n$ -dimensional non-Euclidean spaces, but complex spaces, discrete spaces, and the like? To turn to a related topic, what status should we give to set theory? Is it merely a natural extension of the Bergsonian notion—quite

new at the time—that mathematical objects should be construed as *systems of relations* between elementary objects (points, instants)? And lastly, what should we say about the purely topological properties of mathematical spaces? Bergson's critique of measurement was originally developed in connection with very basic examples of the kind one may find in the *Transcendental Aesthetics* (tracing a line, building a triangle in Euclidean space, counting successive moments...). Does the critique apply equally well to the more elaborate, but nonetheless effective and useful modes of spatiality developed in the wake of modern geometry and physics?

There are a thousand reasons for remaining less than satisfied by the Bergsonian treatment of the relationship between *durée* and space. Suppose we take seriously the idea that our intelligence is not confined simply to the pragmatic task of manipulating the physical things under hand or manufacturing tools for doing so, but is ontologically committed with the genesis of materiality, as Bergson claims. Suppose, in addition, that the universe as a whole is continuously undergoing becoming, as Bergson often insists, and that space is nothing more than matter (and hence, duration) in its most relaxed state, i.e. an ideal limit for which geometrical concepts provide partial yet effective templates. Then it is clear that *real space*—let's introduce the term by way of symmetry with the "real time" discussed earlier—can have a content that is far richer than that allowed in *Données immédiates*, which is in fact mainly concerned with the intellectual schemes underlying the representation of space as numeric multiplicity. If there is such a thing as real spatiality embedded in the unfolding universe, surely intelligence must have a grip on it. It is only the habits reinforced by the endless reliance on "useful conventions", to use Poincaré's expression, that condemn us to eternally orbit the circles of Euclidean geometry. It remains to be seen whether these richer and more diverse modes of spatiality can be accommodated in the intensive schema elaborated from *Matière et Mémoire* onwards, with its degrees of duration and variably contracted rhythms.

## THE PROBLEM OF CO-EXISTENCE: THE LOCAL AND THE GLOBAL

Contrary to what Bergson himself sometimes suggested, the question of the nature of space lies at the heart of his debate with Einstein. One reason for this is the simple fact that the concept of simultaneity is occupying centre stage—though it should be noted that in his discussion of Einstein, Bergson was operating with a conception of simultaneity that is altogether different from the conception that

can be found in his earliest works, where it is defined as the mere intersection of time with space. There is a second reason: in developing his concept of “real time” in *Durée et Simultanéité* Bergson was intending to project *durée* onto a particular aspect of *measured* time. While this may come as a surprise to some, there can be no doubt at all that real time—the figure of *durée* which comes to the fore in *Durée et Simultanéité*—is a kind of time that is inherently measurable and quantifiable. The distinction between real and fictitious time (e.g. symbolic, or purely mathematical representations of the temporal) runs within measured time itself. If it were otherwise Bergson would never have dreamed of resisting the *metrical* consequences of the famous “twins paradox” attributed to Langevin. What Bergson contests, clearly wrongly—as confirmed by all the relevant lines of facts—is the thesis that the twin who is accelerated in his spaceship can give a different *measure* of the *durée* that has elapsed during his trip, a *durée* that is thus (allegedly) substantially identical, but also metrically equal, to the *durée* experienced by his brother who remains on Earth. In more precise terms, Bergson holds that there is only a single interval of “real time” between the moment when the twins separate, and the moment when they are reunited. But it is clear that what is at stake here is not *durée* in general, but only the particular times measured by conscious human observers, who are able to plot the flux of their lived experience against the reference frame defined by their measuring equipment.

What is of interest to us in Bergson’s entangled discussion of this typically relativistic setting is the more general problem regarding the framing of time. The point is that real time isn’t necessarily lived time: Bergson only requires that time *can* be lived through. In contrast, it’s essential to real time that it should be actually measured.<sup>27</sup> Consequently, it is not enough to remind us that *durée* in its pure state is by its nature unmeasurable or unquantifiable. We must accept that lived *durée* can, in a manner of speaking, take leave of itself and adopt an observation point in the domain of the measurable, so as to give a *perspective* on other *durées*, and so recognize that their flows unfold simultaneously. For there is no room for doubt: the twins are, in some real sense, contemporaries. To accommodate this fact we have to accept that the “proper times” that can be found in distinct spatial locations are in some way commensurable. This is the theoretical setting that Bergson wishes to consider. Are relative measures of elapsed time enough to capture the metaphysical import of the thick notion of simultaneity that Bergson has in mind (i.e. a simultaneity not confined to zero-duration instants)? The difficulty is that the “proper time” of the equations of physics—the quantity that is guaranteed to be invariant through changes in frame of reference—is a time

which is completely lacking in global significance: it is a strictly *local* determination of time, bearing no perspective on other times. Mathematically speaking, it primarily functions as a parameter. It is in some respects less artificial than the coordinate times linked to particular inertial reference frames, but there is nothing intrinsically temporal about it. As Piaget would put it, proper time is nothing more than “spatial succession.” Unless that is, a sort of “reality transfusion” occurs whenever we consciously think about it: then, the worldlines traced out by the occupants of four-dimensional Minkowski spacetime become infused with *durée* deriving from our own consciousness, with the resulting illusion that the entire scene can be re-animated and set into motion despite the lack of an overall time frame. But truly speaking, what we are dealing with here are purely local and *a priori* disjointed measures of material *durée*. These measures exist alongside the *basso continuo* of the lived *durée* of conscious observers—a *durée* characterized by the degree of tension typical of humankind—without any straightforward notion of real simultaneity between flows. Any attempt to uncover from these ingredients a genuinely temporal unity of the material universe is bound to fail. Anyone attempting cosmological unification on such a basis would run the risk of indulging in psychological metaphors (a super-human consciousness sweeping across the universe...), at the risk of being swiftly undermined by scientific objections—not least those of Einstein, who, it will be recalled, refused to admit the existence of a philosophical time, distinct from the time of the physicist and the time of the psychologist.<sup>28</sup> Above all, what is still lacking in the way the problem is framed by physicist and most philosophers of physics is a clear conception of temporal perspective, one which acknowledges the possibility of effectively extending time through space, via the operation of measurement. What we still need, in other words, is a conception of real space—or if one prefers, real simultaneity—that is fitted to address the cosmological challenge.

At the very least Bergson managed to point his finger in the direction of the principal problem: finding a mode of cosmological connection which accommodates the legitimate demands of *situation* (*context*) and *perspective*, with determinations of time that are *global* as much as *local*. His confrontation with Einstein’s special theory of relativity led him to formulate an issue that is crucial to our understanding of the nature of physical time: the simultaneity or coexistence of spatially separated flows (or *fluxes*) of duration, a coexistence that is irreducibly temporal and spatial, and which in no way undermines the evidence suggesting that instantaneous simultaneity (the punctual “now”) is by necessity relative to the choice of a particular reference frame (i.e. a system of coordinates extending through the

totality of space).

Admittedly, the familiar Bergsonian distinction between *durée* and space, qualitative multiplicity and quantitative multiplicity, isn't a great help here: the best it can do is provide us with a name for our problem. The problem of simultaneity—of real simultaneity, envisaged *sub specie durationis*—should be formulable in terms of space-time. It is unfortunate that physicists continue to think they are doing philosophers a favour in conceding to them that the distinction between lived time (“psychological time”) and objective time (“clock time”) still has relevance and validity. For this reason, and notwithstanding their prominent role in mainstream Bergsonian scholarship, we propose to banish all use of expressions such as these, once and for all. It is now apparent that everything hinges—as in reality it has done since the start of the debate—on measured time. Giving a privileged status to psychological time—as if it were a valuable treasure which must be preserved from the threat of our inherent spatializing tendencies—assists not at all in solving the problem. Langevin once proposed translating “lived time” by “proper time”, as if it were a matter of finding a common lexicon. This concession to the philosophers was meant as a conciliatory measure, but in the end it did more harm than good. In the absence of a single temporal metric extending over the whole of spacetime, any common measure of time at a distance is arbitrarily bound to a particular reference frame. The fact that similar temporal units are used across space produces an illusion of temporal homogeneity. The truth is that in space-time one only finds *spatio*-temporal homogeneity: the intervals of proper time corresponding to different spatio-temporal trajectories remain in a sense incommensurable, which lends support to the notion that time is fundamentally and irreparably disunified. The paradox of the twins, who are somehow contemporary despite their diverging temporal experiences, embodies this general issue. Einstein was candid enough to admit that he did not see any genuine problem there. But the issue has recently returned in the guise of a proliferation of *non-standard definitions of simultaneity*. If much of the philosophical debates largely ended up focusing on the issue of whether such definitions are conventional or non-conventional, it's interesting to note that metaphysicians in the analytic tradition have recently been exploring the question while not confining themselves to strictly epistemological considerations. These philosophers have started developing *regional* models of coexistence (featuring an extended, non-pointlike conception of location); these have the advantage of being directly derivable from the *topological* structure of Minkowski space-time, thereby giving access to the deeper features of real space.

## BETWEEN CONFABULATION AND CREATION: LIVING AND THINKING WITH SCIENCE

By way of conclusion, let's return to the relationship between philosophy and the sciences. Bergson laid the foundation stones of his methodology, and undertook his early research in a climate that was still largely dominated by a positivistic faith in the elucidatory powers of mechanistic modes of thought. With the advent of the 20<sup>th</sup> century, he was alert—as were others—to what would soon become known as the “crisis of the sciences,” a crisis to which he would himself contribute: for example, by popularizing a pragmatist conception of scientific theories, which were to be viewed as intellectual tools, designed to capture only the measurable aspects of physical reality. But there is no getting away from this fact: much of what Bergson had to say on these matters needs revisiting in the light of the revolutions which occurred in the first third of the 20<sup>th</sup> century, revolutions that so profoundly disrupted the scientific image of the world. Needless to say, we are thinking here of general relativity, about which Bergson said practically nothing, but also of quantum mechanics, molecular biology and information theory—without even mentioning the foundational advances made in logico-mathematical fields. These revolutions have led to a revision of the categorical frameworks on which the philosophy of the natural sciences had based itself since Kant. They have also impacted our understanding of the significance and scope of scientific theories in general. Their sheer diversity greatly complicates the “grand unification” project, which is based on the idea that nature is a totality governed by universal laws. If our expanded bergsonism is to avoid exhausting itself fighting straw men—in the form of a “mechanistic” science which had already been superseded in our grandparents' day—it is crucial that we take proper account of these recent developments.<sup>29</sup>

We noted earlier that a positive metaphysics must establish a “critical distance” with respect to scientific theories, where this goes beyond elucidating their epistemological or metaphysical foundations. The need for such a distance derives, in part, from the character of the sciences themselves, of which we now have a better understanding. To put it succinctly: the ontological claims made by a scientific theory are genuine, but invariably *limited*. Although a theory will provide us with a description of reality, it does so only in a certain manner, under a particular perspective, and it will not be able to supply a full justification for so doing. Hume was the first to make this point: a scientific theory will always be incapable of supplying its own foundation or justification. Thanks to the work of Gödel on the

incompleteness theorems, we can say the same today about the formal sciences.

From a Bergsonian perspective there is nothing surprising here: *even mathematical proofs are, ultimately, nothing more than formalized gestures*. As Guiseppe Longo has established, as well as rules of inference, they invariably employ constructive principles.<sup>30</sup> This “deterritorialization” of science (as we might put it) is not a product of the content of its theories, but is due instead to their essentially pragmatic or practical nature. We find here, illuminated from yet another angle, the redoubling of immanence. A scientific theory tells us, at the level of thought, of a world other than thought; it concerns the very same physical and biological world to which we are ourselves anchored by the demands of action. As a consequence, science brings into play what we can call an *enlarged experience*, or alternatively, a *decorrelated* experience. We find ourselves simultaneously in the world of our own thoughts, and in a physical world that is not our own. Thus although the “points of view” of science and consciousness certainly intersect, neither can be reduced to the other. Bergson introduced this thesis, in his own manner, in terms of “systems of images” in the famous opening section of *Matière et Mémoire*.<sup>31</sup> This requires more than is offered by either the scientific approach, or phenomenological idealism. This is also the explanation of why we find Bergson’s approach at the heart of lively debates in the contemporary French philosophical scene, ranging from Deleuze to Quentin Meillassoux, Pierre Montebello or Renaud Barbaras.

It is within the space of this impossible-to-fill critical distance that we find the location of the *artist*, as construed by Bergson. In other words, and borrowing from the fortuitous formulation of Jean-Marc Lévy-Leblond, *science is not art*. Just as positive metaphysics cannot be reduced to the task of revealing the ontological commitments of a scientific theory, the truly creative work of an artist does not consist in simply showcasing—by way of metaphor or simply illustration—a concept or hypothesis that one would find ready-made, and more precisely stated, in some scientific theory. Da Vinci’s paintings were not conceived to illustrate the golden ratio, similarly, Duchamp’s installations were not intended to reveal to us the nature of the fourth dimension. It’s quite the opposite. The artist is someone who is essentially “distracted,” Bergson tells us: he is a seer, not a scientist—a seer whose task is to reveal what scientists themselves cannot perceive, due to the very ontological commitments of their theories. In acknowledging the clairvoyance of artists we are not, of course, committing ourselves to a (slightly) suspect neo-romanticism. The artistic vision can have the most abstract and formal manifestations. Think of the work of François Morellet: although his artistic op-

erations remain in the domain of the sensible, they are often indiscernible from mathematical gestures. Art and science can also work together in an experimental mode, as shown by the “constrained” fictions invented by Philippe Ramette, which illustrate so well the affinity between certain artistic practices, and the rigorous yet risky activities of science conceived as “*cosa experimentale*.”<sup>32</sup>

In any event, there is no *a priori convergence* between artistic creation and technoscientific research. It’s rather their complementary divergence that we should be emphasizing, because it makes the *fiction* and *interpretation* that are inherent in art so valuable, even if there exist a wide range of potential interactions between art and science. These considerations suggest a re-evaluation of Bergson’s notion of a “fabulatory function.” This notion is originally associated with “closed” morals and religion, but it’s worth wondering if a fabulatory dimension isn’t invariably a feature not just of religion and morality, but in the sciences as well. There are two reasons for this.

First, it is simply impossible to separate entirely science and culture. The two are irretrievably locked together. Lévy-Leblond was right when he observed that we find *interpreters* not only in music or theatre, but also in science, where they can be good or bad (in the latter case we tend to label them “popularizers”). In today’s highly complex sciences, the presence of an interpretive dimension is increasingly evident: the importance of the notion of a “model” in contemporary science provides one illustration of this, another is linked to the fact that scientists are systematically confronted with the problem of “underdetermination of theory by data” (a theme found in the philosophy of science, in Duhem, Quine and Atlan).

Next, as Dominique Janicaud has noted, it is necessary to distinguish between science itself and the power of science.<sup>33</sup> Somewhere in between, we find technoscientific research, which is less and less devoted to science and more and more devoted to its power. To put it another way, today’s technoscientific research lies at the heart of a *technoeconomic* enterprise which is transforming nature at an industrial scale—and industrial speeds. As Hans Jonas has shown, what nature *is* now depends on what mankind can and wants to do with it. What we are dealing with here is not solely a matter of fact, but also of value, so the problem of the power of science isn’t just a theoretical problem: it’s an axiological problem, one which places us at the intersection of *knowledge* and *belief*.

However, to come back to Bergson's original intuition, confabulation goes hand in hand with closure, and it's to the latter notion that we need to attend if we are going to fully appreciate the critical requirement which underpins the relationship between philosophy—or culture at large—and science. The tension exerted by scientific prejudices upon the formulation and popularization of scientific knowledge is an instance of the kind of closure that preoccupied Bergson, a relation which pushes the scientific world to close in on itself, rather than opening itself up to the cultural universe which in fact—paradoxically—feeds and nourishes it. In another sense, we can also wonder how to properly understand the distinction between *fiction* and *confabulation*. Here we venture a hypothesis: artistic fictions and inventions do not rest on the same *belief regime* as science. This becomes apparent when one examines the relationship between “cognitive hallucinations” in science and the “suspension of incredulity” which operates in fiction—and perhaps even more strongly in science fiction literature (and films). Blondlot's “N-rays” constitute one classic example of a cognitive hallucination in the history of science, but we could just as easily cite controversies linked to the supposed discovery of the “memory of water.” In such cases, how does one go about separating the wheat from the chaff? What distinguishes the rational belief that is an inherent component of good scientific practice from wholly unreal fictional creations? Is there any alternative to mounting a critique of (what we might call) the “spontaneous ideology of scientists,” or alternatively, a psychoanalytic investigation of their motivational and cognitive biases? What really differentiates the hypotheses of N-rays from that of the ether—a hypothesis that was revived on several occasions over the past two centuries? Or the memory of water from Ptolemy's epicycles, or the epigenetics of contemporary molecular biology? What is the difference between the “psychical sciences” in which Bergson was once seriously interested—prior to their fall into disrepute, and subsequent categorization as mere pseudo-sciences—and certain researches conducted today at the frontiers of art, anthropology and psychoanalysis? Such questions are on the horizon of our expanded bergsonism: “alterscience” may just be pseudo-science, but this should not blind us to the utopian potential of a truly *open* science.

## ENVOI

Do we really need to spell it out? On all these questions, and on many others we have been unable to consider here, we are not proposing to scrutinize contemporary sciences—or their ordinary modes of practice—for *confirmations* of one or other of Bergson's doctrines or presentiments. Irrespective of whether we are

dealing with the enactive theory of perception, the neurophysiological basis of memory, or any other line of contemporary research, intuitions do not exist to be rediscovered and confirmed. Their role, rather, is to raise new questions, and so in a fashion to make matters more complicated than they already are. Bergson succeeded in devising a method which makes it possible to discern and create new *problems*—the originality of some of the problems he formulated for himself still have the power to astonish us. It is in the light of the questions he bequeathed to us, and above all in the light of those he allowed us to pose in our turn—not any particular doctrine or vision of the world<sup>34</sup>—that we have to ask ourselves today, collectively, whether we still *want* to be Bergsonians, and whether we still *can* be.

In brief, we possess even now a certain number of *lines of facts*, which do not take us as far as we want, but which we can extend hypothetically. I would like to follow some of these with you. Each, taken by itself, will lead us to a conclusion that is merely probable. But taking them all together, they will—by their convergence—bring before us such an accumulation of probabilities that we shall feel that we are on the road to certitude, or so I hope. Moreover, we shall come nearer and nearer to it through the joint effort of philosophers who will become partners. For, on this view, philosophy is no longer a construction, the systematic work of a single thinker. It needs, and unceasingly calls for, corrections and retouches. It progresses like positive science. And like a positive science, philosophy too is a work of collaboration.<sup>35</sup>

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## NOTES

1. Étienne Gilson, « Souvenir de Bergson », *Revue de métaphysique et de morale*, 64, 1959, p. 136. When writing this Gilson had a specific example in mind: “The most overtly ‘Bergsonian’ of those who bear the mark of his influence, Édouard Le Roy, has always refrained from adopting the same doctrines as the philosopher to whom he has rendered so many and so fervent tributes. [...] This wasn’t a matter of betraying Bergson but rather of imitating him: whenever Bergson approached a new problem, he would always approach it as a wholly new problem, one requiring a wholly new effort.” On the import of the label “Bergsonian”, see Giuseppe Bianco, *Après Bergson : portrait de groupe avec philosophe*, Paris, Presses universitaires de France, coll. Philosophie française contemporaine, 2015.
2. In this regard, the colloquium devoted to *Matière et Mémoire*, organized in Japan by Yasushi Hirai, Hisashi Fujita and Shin Abiko was exemplary (“The Anatomy of *Matter and Memory*: Bergson and Contemporary Theories of Perception, Mind and Time”, 7th International Workshop of the Project Bergson in Japan, Tokyo et Kyoto, 10-13 décembre 2015). This manifesto—drafted between two sessions—is a direct result of this seminal event.
3. In the first chapter of *Matière et Mémoire* Bergson describes the phenomenon of “total reflexion” which serves as an analogy for pure perception. (*Matière et Mémoire*, Paris Presses universitaires de France, 2007, p. 34).
4. Jacques Rancière *The Flesh of Words: The Politics of Writing*, trans. C. Mandell, Stanford University Press, 2004, p. 164.
5. See the introduction to “Bergson et la science”, P.-A. Miquel and F. Worms (eds.), in *Annales Bergsoniennes*, n°3, Paris, Presses universitaires de France, coll. Épiméthée, 2006.
6. A 1938 interview with Bergson, cited by Lydie Adolphe, *La Dialectique des images*, Paris, Presses universitaires de France, 1951, p. 4.
7. “Recouplement”, as Bergson uses the term, involves both intersecting and double-checking.
8. Lydie Adolphe, *op. cit.*, p. 4.
9. Henri Bergson, « Discussion à la Société française de philosophie, 28 novembre 1907 », in *Écrits*, Paris, Presses universitaires de France, 2011, p. 353.
10. *Ibid.*
11. The “tightening” of problems is complementary to the process of “recouplement” (see note 8 above). The best example of the strategy is provided by *Matter and Memory*, and the decision to concentrate on the phenomenon of memory, and more specifically, the exemplary case of aphasia, which allows Bergson to broach the question of mind-body dualism “at the point where the activity of matter brushes against that of spirit.”
12. A point Camille Riquier brings out well in his *Archéologie de Bergson*, Paris, Presses universitaires de France, 2009, p. 253.
13. Cf. *L'Évolution créatrice*, Paris, PUF, 2007, p. 239: “The dialectic is necessary to put intuition to the test, but also so intuition can be refracted in concepts, and propagated to other people.”
14. Henri Bergson, *La Pensée et le mouvant*, Paris, Presses universitaires de France, 2007, p. 67.
15. A note from May 16, 1912, concerning Joseph Deseynard’s *La Pensée d’Henri Bergson*, which was published in November 1912 (Fonds Doucet, BGN 2966), and cited by C. Riquier, « “Voir et cependant ne pas croire”: Intuition et méthode chez Bergson », *Transparaître*, n° 1, « L’intuition », décembre 2007, p. 192.
16. Although it’s clear that Bergson didn’t envisage philosophy being able to contribute directly to the development of new scientific theories by substituting metaphysical considerations

for scientific explanation, it's equally clear that he didn't see its role as being limited to one of epistemological clarification. In certain cases a philosopher can propose to arbitrate between competing theories, based on their ability to account for "experience in its entirety," or at least to contribute to an inquiry aiming at a more comprehensive view of reality: it's in this way that Bergson was an "interventionist" in the field of biology, to use Jean Gayon's expression. We have already cited this remarkable passage: "'The intuition that I have spoken of can only enter into play after one has studied, deepened, and often even expanded upon everything that empirical science has to say on a certain issue.'" By following the lines of facts, philosophers can sometimes uncover new ones.

17. Henri Bergson, « Le parallélisme psycho-physique et la métaphysique positive », in *Écrits philosophiques*, Paris, Presses universitaires de France, 2011, p. 249.
18. Henri Bergson, *La Pensée et le mouvant*, *op. cit.*, p. 72.
19. Raymond Ruyer, *Néo-finalisme*, Paris, PUF, 2012, p. 272-273.
20. Frédéric Worms, *Bergson ou les deux sens de la vie*, Paris, Presses universitaires de France, 2004. This theme also resonates in a book inspired by the work of Winnicott and de Bowlby devoted to the concrete forms of linkage and attachment: *La Vie qui unit et qui sépare*, Paris, Payot, 2013.
21. On this topic, see the remarkable analysis provided by Pierre Montebello in his *L'autre métaphysique : essai sur la philosophie de la nature, Ravaisson, Tarde, Nietzsche et Bergson*, Paris, Desclée de Brouwer, 2003.
22. See Giuseppe Longo, Maël Montevel, *Perspectives on Organisms: Biological Time, Symmetries and Singularities*, Berlin, Springer, 2014.
23. Gilbert Simondon, *L'Individuation à la lumière des notions de forme et d'information*, Grenoble, Jérôme Millon, 2005, p. 25.
24. "Being possesses a transductive unity, i.e. it can dephase in relation to itself, and overflow itself from either side of *its centre*" (*ibid.*, p. 31).
25. By way of example, this is the approach adopted by Barry Dainton in his studies devoted to temporal experience. Yasushi Hirai provided a very interesting examination of Dainton's work in a lecture at the "The Anatomy of Matter and Memory" conference in December 2015.
26. See the works of David Lapoujade, Hisashi Fujita or Sébastien Miravète.
27. There is no shortage of textual evidence of this thesis, but for present purposes three occurrences will be sufficient. On p. 82 of *Durée et Simultanéité*, we find "What is real is what is measured by a real physicist". On p. 207: "Real time is... the time that physicists perceive and measure...". Lastly, on p. 209: "Real time, measured by real clocks...".
28. Regarding the context of Bergson's confrontation with Einstein, see Jimena Canales, *The Physicist and the Philosopher: Einstein, Bergson, and the Debate that changed our Understanding of Time*, Princeton, Princeton University press, 2015, as well as the critical edition of *Durée et simultanée* by Elie During, Presses universitaires de France, 2009.
29. In this respect Bachelard was obviously not wrong to point to Bergson's geometrical obsessions, and to criticize his lack of interest in the problems posed by the use of probabilities in science, and more generally algebra. That did not prevent his praising the creative syntheses achieved by the new mechanics in very Bergsonian terms, such as "spiritual élan" and even "élan vital" (*Le Nouvel esprit scientifique*, Paris, Presses universitaires de France, 1934, p. 183).
30. Francis Bailly and Giuseppe Longo, *Mathématiques et sciences de la nature : la Singularité physique du vivant*, Paris, Hermann, 2006.
31. "No philosophical doctrine disputes the fact that the same images can enter at the same time

into two distinct systems, one belonging to science, wherein each image, related only to itself, possesses an absolute value; and the other, the world of consciousness, wherein all the images depend on a central image, our body, the variations of which they follow.” *Matière et Mémoire, op cit*, p. 21.

32. We take this expression, and the two examples, from Jean-Marc Lévy-Leblond.

33. Dominique Janicaud, *La Puissance du rationnel*, Paris, Gallimard, 1985.

34. Is the universe itself in the process of becoming? It will remain a matter of taste as long as the reasons for holding one view or the other have not been fully spelled out. Following William James, we need to make sure that genuine becoming makes a real difference. This is our advice to those who enjoy the sparring between “presentists” and “eternalists.”

35. Henri Bergson, *Mind-Energy*, tr. H. Wildon Carr, Henry Holt & Company, 1920, p.7.