Kant begins the first edition of *The Critique of Pure Reason* by saying that the understanding produces experience by ‘working up the raw material of sensible impressions’.\(^1\) For Kant, this work takes the form of a synthesis of the manifold of intuitions carried out by the transcendental imagination. The synthesis is the condition for the possibility of experience, and as such necessarily takes place prior to experience. So fundamental is the work of synthesis, that science, too, rests on the foundation it provides, and operates within the limits it defines. By contrast, the development of modern science, and in particular the physics of the atom, led Bachelard to conclude that science guided by mathematics, produces not just new objects, but new kinds of objects – new phenomena; and in order to do this, it must first of all work on the fundamental intuitions of time and space. Reflecting this change, Bachelard introduces what he calls ‘un kantisme de deuxième approximation’ in which the work of synthesis that had been carried out in transcendental consciousness is transposed to scientific – and above all mathematical – rationality, becoming in the process a deliberate construction of the conditions of new

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phenomena.\textsuperscript{2} Both Kant and Bachelard, then, state that intuitions have to be ‘worked’, but their understanding of what this means is completely different. In this paper, I will show how Bachelard’s conception of temporal discontinuity is an essential condition of this work, and thereby essential to his idea that scientific reason constructs new forms of experience. However, I will argue that the most important contribution of temporal discontinuity is to make the formal conditions for the intuition of phenomena complex. It is only on the basis of this complexity that the scientific mind can be creative in the way Bachelard proposed.

Bachelard’s ‘non-kantisme’ operates on the basis of forms of sense that are more general than those which underpin Kantian philosophy: that is, time and space are given a functional definition of which the time and space of sensible intuition are merely special cases.\textsuperscript{3} In this way, the objects of sensible intuition are themselves special cases of phenomena that are more mobile, and altogether less ‘thing-like’ than anything in our everyday experience. As Bachelard writes, ‘la science contemporaine veut connaître des phénomènes et non pas des choses. Elle n’est nullement chosiste. La chose n’est q’un phénomène arrêté’.\textsuperscript{4} In order to make this active construction of phenomena possible, it is necessary to ‘faire monter les deux formes de l’intuition sensible jusque dans l’entendement, en laissant la sensibilité à son rôle purement affectif…’\textsuperscript{5} Bachelard insists on a clear separation between the constructive activity of the understanding, and the passive role of sensibility. This, he continues, will mean that phenomena can appear in a ‘thought space’ and a ‘thought time’ – which is to

\textsuperscript{2} Gaston Bachelard, \textit{La philosophie du non} (Paris, Presses Universitaires de France, 1940), 94.
\textsuperscript{3} Gaston Bachelard, \textit{La philosophie du non}, 94.
\textsuperscript{4} Gaston Bachelard, \textit{La philosophie du non}, 109.
\textsuperscript{5} Gaston Bachelard, \textit{La philosophie du non}, 110.
say, in forms of time and space that have been constructed. In part, Bachelard’s purpose here is simply to reflect developments that had already taken place in scientific thought, such as the introduction of non-Euclidean geometries and the non-classical behaviour of particles in quantum physics. But in a wider sense, Bachelard wants to provide a philosophical framework in which scientific thought has the liberty to continue inventing new realities, new phenomena with distinct ways of inhabiting time and space. If the conceptual invention of mathematics were to remain tied to the forms of sense embedded in sensible intuition, then this liberty would be severely restricted. This is why, for Bachelard, the understanding has to be separated from sensible intuition.

Mathematics itself provided one route to this liberty with the development of set theory, whose objects need only be constructable according to a defined rule, and not actually constructed. Bachelard is very positive about the separation between scientific thought and sensible intuition that this allows. However, it could only be taken as a solution to the problem if the whole of science were installed in a set theoretical framework, and this is not Bachelard’s approach. Instead, he develops a conception of time that gives liberty to the understanding in all circumstances, science being just a particular case of a more general capacity to modify the formal conditions of intuition.

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Bachelard’s account of time is found in two texts published in the 1930s: *L’intuition de l’instant* (1931) and *La dialectique de la durée* (1936). His understanding of time was inspired, he writes, by the work of the historian Gaston Roupnel, but it is also developed, at least in part, as a reaction against Henri Bergson’s conception of time as a continuous duration (*durée*). If time is continuous, the instant is nothing more than ‘une fausse césure’ beneath which there lies a fundamental continuity between the past and the future. However, in Bachelard’s view, this continuity makes it difficult to account for the appearance of what is new, since the appearance of what is new requires an absolute beginning – and it is precisely this that continuity excludes. Such a beginning must therefore be characterized by discontinuity, and it is described by Bachelard as an act.

In order to speak about an act as an absolute beginning, Bachelard anticipates the need move away from Kant that he sets out later in *La philosophie du non*, stating: ‘Essayons alors de détacher notre esprit des liens de la chair, des prison matérielles’. In Kantian terms, to separate mind from body is to separate the understanding from sensibility. But its significance lies in the fact that the mind is then free to act without the constraints placed on it by the intuition of sensible objects, and by the apparent continuity of their existence. Knowledge, he writes, is ‘une oeuvre temporelle’, and in the mind knowledge presents itself as a series of separate instants. In short, in temporal terms, an absolute beginning requires an instant; and in terms of the mind, an absolute beginning requires an act of the mind that is free from the conditions of

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experience that have existed up to this point. There is therefore a happy convergence between the two sides of the account; ‘l’acte est instantané’, and reciprocally ‘l’instantané est acte’.  

It is therefore the instant, temporal discontinuity, that allows Bachelard to describe the mind as able to make an absolute beginning that breaks with the past. However, there is more to the story than this. The past to which I have referred so far is a past that rises up from things, from their substance, and which ties the mind to forms of unity, relation, and existence that are familiar from our sensible experience. A creative mind may indeed find it necessary to escape from such forms. But what of the history of thought itself, the history of the mind’s own activity? What relation does the act, and the instant, bear to this history?

To address this question, it may be helpful to look again at *La philosophie du non*, and the nature of the break that it proposes with the philosophical past. What is the ‘non’ that defines this way of thinking? The negation to which Bachelard refers here defines a new position that is *not* determined by the conditions that precede it. Yet neither is the new position entirely unrelated to its past, as if each act were a completely new beginning. For the new position is part of a constructed series that exhibits a certain order, and therefore a certain rationality. In the act, the mind thinks *against* something, separating itself from its past, but always in a way that is informed by the past. Even if one accepts that the act is not determined by the past to which it responds, it is nonetheless the case that the past is a background against which the act

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occurs, and insofar as this background provides something to react against it is a resource for the scientific mind.

So how does the act occur? To understand this, one needs to understand the separation of the act from its past, but also its connection. One has to understand the relation of the thinking to the history against which it acts.

In *La philosophie du non*, Bachelard discusses different conceptions of the atom that were proposed in the early part of the 20th Century. Niels Bohr put forward the image of the atom as a tiny solar system, with planetary electrons orbiting around the nucleus. Arthur Eddington then argued that the orbits of electrons around a nucleus could not be likened to a real movement in space, since it was generally accepted that the usual conception of space did not translate to the sub-atomic scale; moreover, the idea that electrons occupied a defined point in space was also in question. Bachelard concludes from this that ‘Il ne nous semble pas, en effet qu’on puisse comprendre l’atome de la physique moderne sans évoquer l’histoire de son imagerie’. This is a very striking remark, and it is especially striking that the ‘non’ which characterizes for Bachelard the creative act of the mind depends on its history. To be precise, the history on which the creative act of the mind depends is not a history that belongs to things, which would inevitably bear within it the continuity of their existence. It is a history of images produced by the scientific mind, and therefore a history of images already freed from the standard forms of sensible intuition. As such, it is a history constructed on the temporal discontinuity of the instant, and the creative act of scientific rationality. The question, once again, is therefore: what is the relation of the

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13 Gaston Bachelard, *La philosophie du non*, 139.
act to the past from which it departs? To put this question explicitly in temporal terms: what is the relation of the present instant to the instants that came before it?\footnote{From a classical point of view, the act which breaks from the past acts on the past but is at the same time acted on by the past–the unity of the two components lying in the change or movement itself. But such a view presupposes continuity, and this, of course, is what Bachelard rejects in favour of the temporal discontinuity of the instant.}

From a classical Aristotelian point of view, the act which breaks from the past acts on the past but is at the same time acted on by the past, the unity of the two components lying in the change or movement itself. But such a view presupposes continuity, and this, of course, is what Bachelard rejects in favour of the temporal discontinuity of the instant. In \textit{L’intuition de l’instant}, he declares that his account of the instant moves towards two conclusions. First, that the only true reality of time is the instant, and time ‘est tout entier dans l’actuel, dans l’acte, dans le présent’ – which is an explicit rejection of the Aristotelian conception of movement as a basis for thinking time.\footnote{Gaston Bachelard, \textit{L’intuition de l’instant}, 52.} Second, that being resonates with the rhythm of instants, so that being has a past in the same way that an echo has a voice (‘comme on dit qu’un echo a une voix’).\footnote{Gaston Bachelard, \textit{L’intuition de l’instant}, 52.}

The present intuition of phenomena is therefore an act conditioned by the past in the sense that the past speaks through it. This does not mean that the present and the future are determined by cause and effect, and it does not mean that the present and the future are the actualization of a potentiality. It would be useful here look at Bachelard’s discussion of ‘les récurrences historiques’ in \textit{L’activité rationaliste de la physique contemporaine}, and his description of habit and rhythm in \textit{L’intuition de}
What emerges from these accounts, and that of habit above all, is that in simple terms the more often phenomena are seen in a particular way, the more likely one is to see – to construct – later phenomena in the same way. This is to say, that the rhythm and regularity of the past does not simply reinforce what one sees. Above all, it reinforces the form of an intuition. Rhythm and regularity provide a rule that serves as the schema for an intuition. However, a rhythm is not a necessary and inevitable schema, and Bachelard warns against attributing to it a force that it does not actually have. This is perhaps because a form that has been repeated countless times begins to appear natural, even universal, and we begin to believe that there is no alternative.

The past, in such circumstances, weighs on us, less because it reaches into the present, than because we reach back into the past, finding there a way of constructing phenomena to repeat, and by repeating to make present again. However, the rhythm, or form, or regularity that we find in the past, and which may then be continued in the present, is never – or rarely – unique. In any given example, there is, Bachelard writes, a plurality of rhythms, forms, or regularities that, through a lack of attention, we reduce to a single unique form. It is, therefore, by being lazy that we allow the past to shape the present and the future.

This failure of attention may happen in different ways, each, perhaps, suggesting a different solution; that is, a different way to work on the form of intuition in order to reveal a complexity that was previously concealed. If it is through a lack of attention that the past takes on the form of a single voice, Bachelard wants us to listen more

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carefully, to open our ears to voices that have had no echo before. But what form does this lack attention take?

First, it may be that by not looking closely enough, I pick out one particular rhythm or regularity and generalise it too quickly, ignoring other rhythms and regularities that cross the first, or lie alongside it. The appropriate response in this case is to give attention to these other examples, to widen our horizons. Second, it may be that by not looking closely enough I fail to see that the one rhythm or regularity I pick out in fact contains within it variations and nuances that I have ignored; that is, there are layers or variations that have been filtered out to leave something simple and univocal that is easily put to work as the form required in the construction of sensible phenomena. The appropriate response in this case is to look more closely at the example I have in front of me, and to find new patterns within it, discovering a richness and complexity that I had failed to notice before. In practice, the distinction between the first two ways is probably impossible to draw, insofar as the complexity of rhythms and forms within the original example may be composed in part by elements that were external to the example as initially viewed. In short, complexity crosses the borders of particular examples, and may even be more intense precisely at such borders. To put this another way around, what is sensed at first as a single rhythm or form may in fact involve complex relations with other rhythms and forms that contribute to the apparently simple rhythm in ways that I had failed to see.

To return to the example of the atom, Bachelard wrote that ‘Il ne nous semble pas, en effet qu’on puisse comprendre l’atome de la physique moderne sans évoquer l’histoire
As I noted earlier, the ‘non’ which characterizes for Bachelard the creative act of the mind depends on a history. But where the history that rises up from the experience of sensible things ties thinking to the same forms, this history is a history of the thought image; and, if viewed with care and attention, it may reveal a surprising degree of richness and complexity. The ‘non’ in ‘la philosophie du non’ is therefore directed not so much against the past, as against what has up to now been taken as the past. For scientific thinking, therefore, the image is what has to be surpassed.

The desire to depart from an intuition ‘as given’ in sensibility leads thinking to modify the rhythm and regularity that gave form to that intuition. Close attention to the image and its history breaks down its apparent simplicity, allowing something of the complexity out of which the phenomenon was drawn to disturb the form into which it had settled. Traces of rhythm and regularity that had been concealed beneath the simplicity of an image may then be combined in a new way to produce the form for a new image. As Bachelard writes in L’activité rationaliste, the emergence of wave mechanics can only be understood if one follows a long historical development, but it would be a mistake to think that it had been ‘historically prepared’. On the contrary, nothing prepared the way for its development, which required a break with what had come before – a break for which the idea of temporal discontinuity, and the instant in particular, provides a conceptual basis. However, Bachelard describes how Louis de Broglie brought together certain hypotheses from Newton and certain hypotheses of Fresnel to analyse the behaviour of particles in a way that belonged neither to the science of Newton, nor to that of Fresnel. This was, he writes, ‘une

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19 Gaston Bachelard, La philosophie du non, 139.  
20 Gaston Bachelard, L’activité rationaliste de la physique contemporaine, 22.
In the terms I have presented the situation here, de Broglie constructed the conditions for new phenomena by combining the rhythms and regularities of Newtonian science with those of Fresnel to create new conditions for new phenomena.

Thinking, then, addresses itself to the rhythms and regularities that give form to intuitions. Close attention to a thing or idea will reveal a greater complexity than was included in the past intuition itself, as intuitions require unity, and unity is always a simplification or a reduction of something more complex. In addition, the rhythm and regularities that give form to an intuition are not limited to those which form the single intuition in question. They may be shared by the schemata of other intuitions. They may emerge as two or more earlier rhythms and regularities grew close together, producing a new rhythm or regularity from the interference between them. In all of this, the image stands as a condensation of rhythms and regularities. If it is understood as the embodiment of truth, it will conceal the complexity and plurality it reduces. Instead, Bachelard would have us treat the image as a provisional schema for intuition that can be modified; thinking can work towards new forms of intuition, new phenomena.

It is clear that all this would be impossible without temporal discontinuity and the freedom it gives to the understanding to construct the conditions of new phenomena and new forms of experience that are not simply the continuation of what had come before. The intuition of the present instant is not explicable in terms of the past. But the invention made actual in the present instant would not be possible without the

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complexity that lies for the most part concealed behind phenomena as they are presented; and this, too, depends on the idea of temporal discontinuity. In fact, one could say that the first achievement of temporal discontinuity, at least for Bachelard, is serve as a condition for this complexity, which is itself a condition for the construction of new forms of intuition.

To illustrate this, let us take the classic example of the melody that Bachelard discusses in _L’intuition de l’instant_. What allows an anticipation of the future development of the melody is not simply the experience of the notes that have already been heard, but the experience of the order in which they are placed, and therefore the rhythm and regularity that determines where each successive note will fall. But in addition, the experience of this order is supported by every other earlier experience of the order of a melody had, and so the anticipation of how the melody will continue is an echo not just of the past of the particular melody to which one is listening at that moment, but is an echo of the past of every melody that one has ever heard (though some more than others). Thinking of the example of the atom in the same way, one finds almost exactly the same relation between the past and the present; where each note in a melody carries within it the rhythm and regularity that tie it to the past, so each image of the atom carries within it the rhythms and regularities that gave form to past images. The past echoes in the present. But at the same time, attention to the complexity of these rhythms and regularities frees the scientific mind to construct a new intuition. To think is therefore to invent, but this invention can only take place in relation to the complex forms that arise on the basis of temporal discontinuity.
Bibliography


