SEIZING AN ALTERNATIVE
Toward an Ecological Civilization
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Section IV: Reenvisioning Nature; Reenvisioning Science
Track 2: Intuition in Mathematics and Physics
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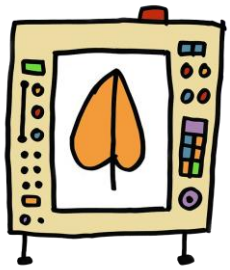

Whitehead's Revolt against the Bifurcation of Nature

"Philosophy," Whitehead writes, "is the product of wonder" (NL 9), but this does not imply that his philosophy of nature is merely the contemplative result of a poetic admiration of nature. It is rather the creative response to a profound sense of dissatisfaction with the oversights of inherited doctrines – oversights revealed by "the testimony of great poets" expressing the "deep intuitions of mankind" (SMW 87) as well as by occasional philosophical insights and new scientific developments.

In a short lecture, it is impossible to give an overview of all the doctrines that Whitehead inherited, and of all the great poets, philosophers and scientists on which he drew. Whitehead offers such an overview in *Science and the Modern World* but, like Whitehead in *Nature and Life*, I limit the list of the inherited doctrines provoking his dissatisfaction to Newton's "scientific materialism" (SMW 17) and Hume's "sensationalist empiricism" (PR 57). Also, I limit the developments that inspired Whitehead's creative response to the development of Maxwell's theory of electromagnetism, and to the emergence of a "radical empiricism" in the writings of a spectrum of philosopher-psychologists, ranging from Bergson in France, over Bradley, Ward and Stout in the UK, to James and Dewey in the US. I am justified in my limitation to psychology and electromagnetism as Whitehead's main sources of inspiration by two of his own claims. One: "If you start from the immediate facts of our psychological experience, as surely an empiricist should begin, you are at once led to the organic conception of nature" (SMW 73). Two: "It is equally possible to arrive at this organic conception of the world if we start from the fundamental notions of modern physics, instead of, as above, from psychology and physiology. By reason of my own studies in mathematics and mathematical physics, I did in fact arrive at my convictions in this way. Mathematical physics presumes in the first place an electromagnetic field of activity pervading space and time" (SMW 152).

Prior to entering into a more detailed account, it is useful to give a broad characterization of the dissatisfaction to which Whitehead responded as a philosopher, that is, of the problem that his organic or process philosophy of nature aimed at solving. Whitehead's dictum – "A problem arises. Philosophy is the search for its solution" (NL 10) – applies to all philosophical endeavors

But what is the problem from which the flight of Whitehead's philosophical adventure departed? And why would it concern us today?

Whitehead was dissatisfied with, and revolted against, “the bifurcation of nature into two systems of reality” (CN 30). The problem he wanted to overcome was the bifurcation of nature in the world of science and the world of intuition, and the associated “pathological case” (FR 11) of their respective philosophical promotion and demotion – the promotion of the speculative concepts of the natural sciences beyond the scope of their methodologies, as if they are “the ultimate categories of explanation” (FR 27), and the demotion of the deep intuitions of mankind, as if they are nothing but illusions.

Today, we still share Whitehead’s concern because this pathology has not simply been cured by the further successes of science. On the contrary, it has developed into one of the root causes of today’s global ecological crises (cf. Code). In fact, this is the reason why our workshop in search for avenues to overcome the science-intuition bifurcation is part of a conference seizing an alternative toward an ecological civilization. In this workshop, Whitehead’s philosophical cry – “The sole appeal is to intuition” (PR 22) – should be our cry, and his first and foremost philosophical criterion – “Conformity to intuitive experience” (FR 67) – should be our guide.

Let me now step back from today’s concerns, and enter into a more detailed historical account of Whitehead’s struggle with the bifurcation of nature, relying mainly on his *Nature and Life*. “Modern physical science,” Whitehead writes in this 1934 booklet, “is the issue of a coordinated effort, sustained for more than three centuries, to understand those activities of Nature by reason of which the transitions of sense-perception occur” (NL 65). But according to Whitehead, Hume’s sensationalist empiricism has undermined the idea that our perception can reveal those activities, and Newton’s scientific materialism has failed to render his formulae of motion and gravitation intelligible.

Whitehead was dissatisfied with Hume’s reduction of perception to sense perception because, as Hume discovered, pure sense perception reveals a succession of spatial patterns of impressions of color, sound, smell, etc. (a procession of forms of sense data), but it does not reveal any causal relatedness to interpret it (any form of process to render it intelligible). In fact, all “relatedness of nature,” not only its causal but also its spatial relatedness, was “demolished by Hume’s youthful skepticism” (R 13) and conceived as the outcome of mere psychological association. Whitehead writes: “Sense-perception, for all its practical importance, is very superficial in its disclosure of the nature of things. … My quarrel with (Hume) concerns (his) exclusive stress upon sense-perception for the provision of data respecting Nature. Sense-perception does not provide the data in terms of which we interpret it” (NL 21).

Whitehead was dissatisfied with Newton’s conception of nature as the succession of instants of spatial distribution of bits of matter because of two reasons. One: the notion of “durationless” instant, “without reference to any other instant,” renders unintelligible the notions of, and equations of motion involving, “velocity at an instant” and “momentum at an instant” (NL 47). Two: the notion of self-sufficient and isolated bits of matter, having “the property of

simple location in space and time" (SMW 49), cannot "give the slightest warrant for the law of gravitation" that Newton postulated (NL 34). Whitehead writes: "Newton's methodology for physics was an overwhelming success. But the forces which he introduced left Nature still without meaning or value. In the essence of a material body – in its mass, motion, and shape – there was no reason for the law of gravitation" (NL 23). "There is merely a formula for succession. But there is an absence of understandable causation for that formula for that succession" (NL 53-54).

"Combining Newton and Hume," Whitehead summarizes, "we obtain a barren concept, namely, a field of perception devoid of any data for its own interpretation, and a system of interpretation devoid of any reason for the concurrence of its factors" (NL 25). "Two conclusions," Whitehead writes, "are now abundantly clear. One is that sense-perception omits any discrimination of the fundamental activities within Nature. … The second conclusion is the failure of science to endow its formulae for activity with any meaning" (NL 65). The views of Newton and Hume, Whitehead continues, are "gravely defective. They are right as far as they go. But they omit … our intuitive modes of understanding" (NL 26).

In Whitehead's eyes, however, the development of Maxwell's theory of electromagnetism constituted an antidote to Newton's scientific materialism, for it led him to conceive the whole universe as "a field of force – or, in other words, a field of incessant activity" (NL 27). The theory of electromagnetism served Whitehead to overcome Newton's "fallacy of simple location" (SMW 49), that is, the conception of nature as a universe of self-sufficient isolated bits of matter. Indeed, we cannot say of an electromagnetic event that it is "here in space, and here in time, or here in space-time, in a perfectly definite sense which does not require for its explanation any reference to other regions of space-time" (SMW 49). The theory of electromagnetism "involves the entire abandonment of the notion that simple location is the primary way in which things are involved in space-time" because it reveals that, "in a certain sense, everything is everywhere at all times" (SMW 91). "Long ago," Whitehead writes, Faraday already remarked "that in a sense an electric charge is everywhere," and: "The modification of the electromagnetic field at every point of space at each instant owing to the past history of each electron is another way of stating the same fact" (CN 148).

The lesson that Whitehead learned from the theory of electromagnetism is unambiguous:

> The fundamental concepts are activity and process. … The notion of self-sufficient isolation is not exemplified in modern physics. There are no essentially self-contained activities within limited regions. … Nature is a theatre for the interrelations of activities. All things change, the activities and their interrelations. … In the place of the procession of (spatial) forms (of externally related bits of matter, modern physics) has substituted the notion of the forms of process. It has thus swept away space and matter, and has substituted the study of the internal relations within a complex state of activity. (NL 35-36)

But overcoming Newton was insufficient for Whitehead because Hume "has even robbed us of reason for believing that the past gives any ground for expectation of the future" (NL 65). According to Whitehead, "science conceived as resting on mere sense-perception, with no other sources of observation, is bankrupt, so far as concerns its claims to self-sufficiency" (NL 66). In fact, science conceived as restricting itself to the sensationalist methodology can find neither efficient nor final causality. It "can find no creativity in Nature; it finds mere rules of succession" (NL 66). "The reason for this blindness," according to Whitehead, "lies in the fact that such science only deals with half of the evidence provided by human experience" (NL 66).

Contrary to Hume, Whitehead held that it is untrue to state that our perception, in which sense perception is only one factor, discloses no creative play of efficient and final causes (cf. NL 68). Inspired by the anti-associationism and radical empiricism of the philosopher-psychologists I listed before, Whitehead launched a new answer to the question for the proper analysis of perception. "The conventional answer to this question," he writes, "is that we perceive Nature through our senses. Also, in the analysis of sense-perception we are apt to concentrate upon its most clear-cut instance, namely sight" (NL 74). However:

> In the first place, even in visual experience, we are also aware of the intervention of the body. We know directly that we see *with our eyes*. That is a vague feeling, but extremely important. Second, every type of crucial experiment proves that what we see, and where we see it, depend entirely upon the physiological functioning of our body. (NL 75)

"Now," according to Whitehead, "the same (direct awareness of the causal efficacy of the body) is true of all other modes of sensation" (NL 76). Moreover, next to our intuition of derivation from our body, "our immediate experience also claims derivation from another source," namely, "our own state of mind directly preceding the immediate present of our conscious experience" (NL 78). "Thus," Whitehead concludes,

> our experience in the present discloses its own nature in two sources of derivation, namely, the body and the antecedent experiential functionings. Also, there is a claim for identification with each of these sources. The body is mine, and the antecedent experience is mine. Still more, there is only one ego, to claim the body and to claim the stream of experience (that constitutes the soul). I submit that we have here the fundamental basic persuasion on which we found the whole practice of our existence. (NL 79-80)

Whitehead's more precise account of the notion of 'intuition' in *Process and Reality* will be given in Farzad Mahootian's lecture, but it is important to already notice that when Whitehead speaks about 'direct awareness', 'immediate experience', 'basic persuasion', etc., we might substitute 'intuition.' If we do so in the next quote, it offers a synopsis of where we are:

> It is the task of philosophical speculation to conceive the happenings of the universe so as to render understandable the outlook of physical science and to combine this outlook with these direct persuasions representing the basic facts upon which (a radical empiricist) epistemology must build. The weakness of the (sensationalist) epistemology … was that it based itself purely upon a narrow formulation of sense-perception. Also, among the various modes of sensation, visual experience was picked out as the typical example. The result was to exclude all the really fundamental factors constituting our experience. (NL 83-84 – Compare with: "The point of the criticism of Hume's procedure is that we have direct intuition of inheritance and memory: thus the only problem is to describe the general character of experience that these intuitions may be included." PR 167)

In order to include these factors, Whitehead asks us to consider the fundamental interconnections of "body and soul, of body and Nature, of soul and Nature," and to notice that they share a "very remarkable characteristic" (NL 84), namely:

> There is a dual aspect to the relationship of an occasion of (the stream of) experience (constituting the soul) as one relatum and the experienced world as another relatum. The world is included within the occasion in one sense, and the occasion is included in the world in another sense. (And) this baffling antithetical relation extends to all the connections which we have been discussing. (NL 85-86)
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> We are in the world and the world is in us. Our immediate occasion is in the society of occasions forming the soul, and the soul is in our present occasion. The body is ours, and we are an activity within our body. This fact of observation, vague but imperative, is the foundation of the connexity of the world … (NL 89-90)

This imperative intuition discloses that "the togetherness of things involves some doctrine of mutual immanence. In some sense or other, this community of the actualities of the world means that each happening is a factor in the nature of every other happening" (NL 87). Hume demolished the relatedness of nature; Whitehead restored it. For example, he founds the "doctrine of causation … on the doctrine of immanence," and writes: "Each occasion presupposes the antecedent world as active in its own nature. … This is the doctrine of causation" (NL 88-89).

After a more extensive account than I can offer here, Whitehead brings *Nature and Life* to its final conclusion: "In this survey of the observational data in terms of which our philosophic cosmology must be founded, we have brought together the conclusions of physical science, and those habitual persuasions dominating … mankind" (NL 90). Translated into my terms, it is also the conclusion of this lecture: Whitehead's radical empiricism is an example of how to overcome the bifurcation of nature into the world of science and the world of the deep intuitions of mankind.

But now the challenge is ours to update Whitehead's early 20th century

philosophy of nature in the light of the early 21st century findings of science and especially, in the context of our workshop, mathematical physics.

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