SCIENTISM AND NIHILISM

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The arguments to be presented and criticized in this paper take as their focus the concept of nature that emerges from the methods and findings of natural science. The general conclusion of these arguments is that scientific accounts of nature give such slight status or support to distinctively human experiences, values, and endeavors as radically to undermine confidence in the meaning of life. The arguments lead, in other words, to nihilism, defined here as the conviction that human life is pointless and absurd. This remains true whether we accept a dualistic or a reductionistic interpretation of the relation of human beings to nature. We will look first at the arguments themselves and then go on to highlight and criticize certain key assumptions on which these arguments rest.

I. Nihilism and the Scientific Concept of Nature

The central premise of the arguments to follow is that science provides us for the first time in human history with a comprehensive and accurate description of the cosmos in which we live; but the sad truth is that nature viewed through the lens of modern science is not at all what we would wish for it to be. *Sub specie naturae*, human civilization and all its accomplishments, to say nothing of mere individual attainments, must be seen as peripheral and insignificant, no matter how important they may appear from a purely human perspective. If nothing else, the incredibly vast spatial and temporal sweep of the universe disclosed to us by science makes the history of the earth and of human beings upon the earth seem trivial and ephemeral by comparison. As Thomas Nagel says, "Nothing we do in this out-of-the-way corner of an unremarkable galaxy would be likely to have cosmic significance, if there were such a thing." (1972:770)

To think otherwise is to fall prey to the illusions of a naive anthropomorphism and an outmoded medieval way of envisioning ourselves and our place in the world. In the words of Max Otto, the scientific account of nature demands that "we assume the universe to be indifferent toward the human venture that means everything to us" and "acknowledge ourselves to be adrift in infinite space on our little earth, the sole custodians of our ideals." (1924:289; quoted Titus 1964:218) The price of accepting the scientific way of thinking is thus to abandon any delusions about the intrinsic value of human life and to realize that human beings have no more importance in the cosmic scale than do the lowliest of nature's living creatures or inorganic productions. Bacteria, specks of dust, the human species—all alike result from a reckless profligacy of indifferent forces and mechanical operations which grind aimlessly on as long as the universe endures.

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To view nature scientifically, according to this way of reasoning, is to view it in a purely "objective" manner. The methods of science are by their very nature detached, dispassionate, and impersonal. They are designed to filter out distortions of human bias, preconception, and wishful thinking, and to present us with an unvarnished description of the facts, those facts which would remain were humans beings entirely removed from the universe. The scientific facts are the elements of nature which can be quantitatively analyzed, subsumed under formal laws, comprehended as the outcome of efficient causes or statistical probabilities, and subjected to rigorous empirical tests. These elements, taken collectively and in the network of their relationships, constitute the whole of nature as scientifically conceived. Existential meanings, values, and the qualitative dimensions of human experience have no place in this picture of nature, because they are not among the objective facts of the "world out there" but only projections of an inner human subjectivity. Just as scientific methods of investigation and confirmation are meant to filter out distortions of subjective preference and value, so the scientific descriptions which result from those methods are descriptions of a nature which is completely objective and value-free.

If we add to this reasoning the widely held belief that the techniques of science are the *only* ones suited to give us reliable information about nature, it then follows that nature as properly understood is devoid of value and oblivious to human purposes and non-scientific meanings. William Barrett underscores the nihilistic implications of this view of the universe when he observes that it leaves human beings "for the first time *homeless*." Nature is "stripped. . .of its human forms" and man presented with a world that is "neutral, alien, in its vastness and force to his human purposes." (1958:30–31) A.N. Whitehead makes the same point when he notes that from the standpoint of the scientific philosophy of the late seventeenth century (a philosophy still widely taken for granted in many of its respects today), nature in and of itself, considered only with references to what are thought to be its objective or "primary" mathematical properties, "is a dull affair, soundless, scentless, colourless; merely the hurrying of material, endlessly, *meaninglessly.*" (1948:55; emphasis mine.)

The French biochemist and Nobel Laureat Jacques Monod, in a book called *Chance and Necessity* (first published in 1970 as *Le Hasard et la Necessite*), sums up for us his sense of the "essential message of science" when he says that its objective portrayal of nature "outrages values" by making them "seem to melt into the world's uncaring emptiness." This portrayal requires that man abandon his anthropocentric and "animistic" biases. He must

> at last wake out of his millenary dream; and in doing so, wake to his total solitude, his fundamental isolation. Now does he at last realize that, like a gypsy, he lives on the boundary of an alien world, a world that is deaf to his music, just as indifferent to his hopes as it is to his suffering or his crimes.
> (1972:172:173)

Monod makes explicit the connection between science's objective mode of knowing, which he takes to be "the *conditio sine qua non* of true knowledge," and the view of nature as empty of value, when he tells us that "knowledge itself is exclusive of all value judgment..., whereas ethics, in essence *nonobjective*, is forever barred from the sphere of knowledge." (1972:174) This means that the sharpest of dichotomies must now be drawn between the values on the basis of which human beings make their decisions, direct their lives, and determine their cultural aims, on the one hand, and the cold austerity of the universe brought into view by the objective methods of scientific research, on the other. It is no wonder that humans tend to see the scientific account of nature as opening up an "abyss of darkness," or that they react to it with a "profound ache" of misgiving and regret (1972:169–170). Although Monod is sympathetic to these feelings, he nevertheless insists that we must follow scientific objectivity wherever it leads, for only in this way can we hope to have firm knowledge of the world and our situation in the world, and to avoid the vain delusions of the past.

Acceptance of this bleak vision of nature, arrived at on the basis of strict demands of scientific objectivity, has given rise to two ways of conceiving the relation of human beings to the natural order. One way is to emphasize the differences between human consciousness and nature to such a great extent as to relegate each to a separate domain of reality. The other way is to place so much stress on the continuities of the two as to argue for the complete subsumption of human life and experience under the scientific description of nature. The first alternative is the way of dualism, and the second is the way of reductionism. Both alternatives have strong nihilistic overtones, as we shall see.

The first alternative sets up two dichotomous realms. First, there is the objective world of nature, scientifically conceived. It is a barren world of sheer facts resolved into mathematical quantities and relations. Then there is the subjective realm of human consciousness, saturated with immediate qualitative experiences of fragrance, taste, color, beauty, joy, sorrow, and the like, and guided by an instinctive sense of purpose and value. Since the world as it objectively is can allow no place to such central human experiences and concerns, they must be regarded as free-floating products of the human mind, set over against the properties of nature and having no purchase or support in nature itself (even though they are believed somehow to be produced and sustained by natural processes).

An image this dualistic view brings to mind is that fascinating childhood toy, the kaleidoscope. When you look through the toy from its "correct" end and begin turning the barrel at the other, you are treated to a dazzling display of ever-changing patterns of color and design. This "world" overflows, as it were, with significance and value; but turn the kaleidoscope to its other end and you see only a few scattered, nondescript pebbles, analogous to the blank and valueless world of objective scientific description. Which is the real world? According to the hypothesis of dualism, *both* are real. Yet the contrast between them could not be more complete.

This separation of the two realms can lead readily to a nihilistic conclusion.

However real in its own right the realm of human consciousness may be assumed to be, the dualistic hypothesis implies a deep estrangement of human beings from nature. How can we feel at home in a natural order which is foreign to our deepest impulses and needs and contrasts utterly in its stark objectivity with the purposiveness and panoplied vividness of our subjective experiences? How can we have any confidence in the value or significance of our lives if they are suspended in a void and radically cut off from the rest of reality? It is not as though we can retreat blithely into the separate realm of mind and ignore the aloofness of nature. Our minds are embedded in our bodies, and our bodies are part and parcel of the natural world. Thus we are at one and the same time intimately conjoined with nature and yet radically alienated from it. We must depend upon it in every moment of our lives, despite its indifference to all we cherish. This stark incongruity seems to give the lie to assurances of someone like Bertrand Russell, in his essay, "A Free Man's Worship" (see Russell 1957), that the scientific view of nature need pose no hindrance to the strivings and achievements of human culture, the latter having its legitimacy and importance in a separate order of reality. For many moderns this kind of assurance carries no conviction. They sense a direct link between the scientific description of nature and a crushing sense of the futility and absurdity of human life.

Not only does the dualistic hypothesis contain the seeds of alienation of human beings from nature, and thus of profound feelings of rootlessness and homelessness; it also suffers from a seemingly ineradicable incoherence that only compounds the sense of strangeness and absurdity. Dualism is open to the charge of incoherence on the ground that it seems unable to give convincing answers to questions like the following: if the two realms of consciousness and nature are as radically dissimilar and distinct as the dualistic theory claims, what commonality, overlap, or basis of interaction can there be between them? What explanation can dualism offer for the intimate dependence of mind on body, or for mind's capacity to affect and to be affected by events of nature through the mediation of bodily processes? How can it account for the human capacity to arrive at an objective knowledge of nature, a knowledge paradoxically assumed in its sharp separation of mind from nature; or for the scientific prediction and control of natural phenomena, undeniable achievements of human culture? Or how can human awareness and culture, if viewed as belonging to a completely different type of reality, ever have arisen from nature or be sustained by nature, even in a purely objective or scientific sense?

This seeming incoherence of the dualistic position has given strong impetus to reductionism as a second kind of response to the scientific description of nature; but the reductionistic hypothesis only brings us to a nihilistic conclusion by another route. In this response, everything human is brought under a scientific description and completely absorbed into the objective facts of nature. The significance of human subjectivity is greatly diminished, if not eliminated altogether. It is no longer seen as a separate order of reality capable of independent action and creation, but is viewed as a mere epiphenomenon or "spinoff"

of natural processes, rather like the vague mist of sublimating snow that rises from the earth on a warm winter day. What looks like purpose, value, and meaning, or the capacity of free decision, is nothing more than a subjective registration of bodily processes, a passive display of neural firings, muscular tensions, visceral churnings, and the like. The mind is a pawn of the powers of the body and can be reduced without residue to scientific, physicalistic descriptions. Thus subjectivity is swallowed up into objectivity, and a monistic theory replaces the theory of dualism. Now the scientific descriptions of nature are believed to encompass the thinker and perceiver as well as what is thought about and perceived. Purpose becomes a veil of illusion cast over purely mechanical operations; cultural meanings become nothing more than genetically inherited survival strategies of one more species of organism, naturally selected for their success in adapting the organism to the environment; values, to the extent that they have any significance at all, become facts to be causally explained.

To the reductionist, there seems to be no way in which scientific descriptions and explanations of the facts of nature can allow for acts of purposive freedom, since these facts are thought to be entirely lawlike in their functions and relations, a pattern of effects flowing with complete predictability from their antecedent causes. Even when elements of indeterminacy are conceded to be operative in nature, as in current quantum theory or evolutionary theory, these are believed to be the workings of blind chance, rather than instancing anything like purpose or design, and to have probabilistic effects at the macroscopic level or ordinary human experience which are still entirely lawlike and predictable in character. So there seems to be no foothold in nature as scientifically conceived for purposive freedom, in the sense of ability to act for the sake of future goals or to make genuine choices among alternative possibilities in a given context of efficient causes.

The contemporary psychologist B. F. Skinner, speaking for his own conception of "the scientific view," rejects the idea that a person "is free to deliberate, decide, and act, possibly in original ways" and that "he is to be given credit for his successes and blamed for his failures." He holds it to be in the very nature of scientific inquiry that we assume that "a person's behavior is determined by a genetic endowment traceable to the evolutionary history of the species and by the environmental circumstances to which as an individual he has been exposed." The more we learn "about the effects of the environment," the less reason we have "to attribute any part of human behavior to an autonomous controlling agent." (1971:96)

H. J. Paton calls our attention to the nihilistic undertone of such reductionistic treatments of consciousness and freedom, carried out in the name of scientific objectivity, when he remarks that man

> displays his intelligence in discovering laws of nature and then awakes, perhaps with horror, to the fact that these laws apply to himself: for science he is only one object among many others and has to be

> understood in the same way as the rest. Thus man is finally entangled in the meshes of the net that he himself has woven; and when we say this, we must add that it is true, not merely of his body, but of his soul. Science is, as it were, a machine constructed by man in order to master the universe; but the machine has turned against its maker and seeks to master him as well. (1955:109–110)

Skinner apparently has little sensitivity to the "horror" of being swallowed up into the objective process of nature, for he dreams of bringing scientific techniques of prediction and control to bear upon human beings in order to program them to want to do only those things that are in their own and society's best interest. This prospect inspires him with optimism, for he thinks it contains the long-sought secret of enduring human happiness. To persist in the belief in human freedom is to be hopelessly unscientific and to place a foolish impediment in the way of those programs of behavioral conditioning which must be put into effect if we are to resolve the chronic problems of human existence. After all, says Skinner (through his spokesman, Frazier, in *Walden Two*), "you can't have a science about a subject matter which hops capriciously about." (See Skinner 1948:257, and *passim.*)

Others, however, can find no cause for celebration in a scientific reductionism which views human beings not as free agents but as automata, and sees all their individual and cultural achievements, to say nothing of their failures and crimes, as following inevitably from their genetic makeups and the conditioning influences of their natural and social environments. This remains true even if they are assured that they can be programmed to become unconcerned about their lack of freedom and to accept without question the conditioning factors in a scientifically planned social environment like Skinner's *Walden Two.* In their judgment no amount of programmed "happiness" can substitute for genuine freedom of action. Such people are painfully attuned to the nihilistic horror of which Paton speaks, because to them a life without freedom is also a life without purpose or value of any kind. The philosopher William James tells of a critical period in his life, in the year 1869, when he felt himself "swamped in an empirical philosophy, *i.e.*, a reductionistic determinism asserting that "we are Nature through and through, that we are wholly conditioned, that not a wiggle of our will happens save as a result of natural laws." (1920:I, 152–153) This philosophy, far from instilling in him any feelings of optimism, shook him to the core and brought him perilously close to a mental breakdown. He was able to find confidence and hope only by rejecting scientific reductionism and developing a philosophy of reality which gives a central place to human freedom. Dostoevsky was another who felt deeply the nihilistic shudder and debilitation of the reductionist view. He observes in his *Notes From Underground* that anyone resigned to the idea that all his actions without exception can be explained in terms of natural laws and mathematical formulas has become "a man without desires, without freewill and without choice. . . ." He is no longer a human being

but "something of the nature of a piano-key or the stop of an organ." (Kaufmann 1956:72,70) Barrett captures particularly well the horror which lies latent in scientific reductionism when he observes that it requires that we think of each human being as "an agent who is in fact a spectator at his own life." (1979:286) For thinkers like these, to go "beyond freedom and dignity" in the name of science, as the title of one of Skinner's books boldly proposes that we must, is to extract the very core of meaning from life.

Another proponent of the reductionistic response to the scientific description of nature is Monod, even though he seems to lapse rather frequently into the language of dualism (see Lewis 1974:27–50). For him, as we have already seen, what things really (objectively) are is what they scientifically are. This includes human beings and all their activities. It encompasses the whole sweep of human evolution, history, and cultural development. In a BBC lecture Monad announces his reductionistic perspective in no uncertain terms: ". . . anything can be reduced to simple, obvious, mechanical interactions. The cell is a machine; the animal is a machine; man is a machine." (Quoted Lewis 1974:ix) In *Chance and Necessity* he argues that cultural achievements like language, religion, and philosophy can be completely explained in evolutionary terms, *i.e.*, in terms of the survival advantages they have conferred on the human species (1971:129–133, 167–169). Like everything else in the universe, the evolution of human beings and the emergence of their distinctive form of life has resulted from the interworkings of pure chance, on the one hand, and existing physical laws, genetic structures, and environmental factors, on the other. Nothing remains, therefore, which cannot be accounted for in a strictly scientific fashion. The human brain, Monod tells us, is not different in kind from a cybernetic machine, and its higher functions, involving conscious awareness and intricate uses of language, can all be brought down to mechanistic explanations, at least in principle, if not in the present state of scientific understanding (1971:148). He speaks on one place of "the dualistic illusion" which would distinguish mind from brain and insists that "objective analysis" requires that we rid ourselves of this illusion, even though we have great difficulty resisting its spell (1971:159).

Monod concludes his book with a vision of a "scientific socialist humanism" which will give authenticity at last to human existence by refusing any claim to knowledge which is not grounded squarely on scientific evidence or on what he proudly terms "the postulate of objectivity." This postulate is to be taken as the foundation of the new social life and outlook which he recommends. It prohibits any mixture of facts and values, and removes values *qua* values altogether from the category of truth. While we can give scientific *explanations* for the presence of human values in general, as well as for given sets of values, there can be no *justification* for these values. All values, including even the value implicit in the positing of the postulate of objectivity itself, are arbitrary and indefensible, for they can never be objectively (*i.e.*, scientifically) grounded or criticized (1971:173–176, 180). In contending that values cannot be scientifically supported, Monod differs from Skinner (Skinner 1971, Chap. 6); but he shares

in Skinner's reductionism and in his optimistic dream of radical social reform based on a thoroughgoing application of scientific principles.

The nihilism inherent in Monod's reductionistic outlook is never very far beneath the surface. It is obvious, for example, that science as he interprets it can give us no help whatever in deciding how we shall live. The postulate of objectivity consigns individuals and societies to an abyss of existential meaninglessness, a vacuum of value in which we must nevertheless continue to choose. Moreover, Monod fails to address the critical question of whether there can even be anything like choice, given his claim that human beings are, at bottom, nothing but machines. He seems to assume a capacity for choice while at the same time denying it by implication with his over-all theory. It is notable that nowhere in the five functions of the central nervous system which he lists and discusses is there any suggestion of a capacity for purposive choice. So it is not even clear that human beings are free arbitrarily to invent their values, as Jean-Paul Sartre has held. Consciousness itself tends to be portrayed by Monod as a mere epiphenomenon, a capacity for subjectively "representing" and "simulating" external events while not having any effect of its own upon them (1971:149–152). In short, Monod's reductionistic approach and conclusions do little to alleviate, and much to support, a consuming sense of the absurdity of the human situation. This suggests from yet another direction how readily the scientific view of nature can gravitate toward nihilism.

In an article entitled "Science in Modern Culture, or the Meaning of Meaninglessness," Eric Weil defines "scientism" as the fundamental attitude that "only what can be established scientifically is true, objective, and valid everywhere and for everybody (madmen excepted), whereas the remainder of human discourse has nothing to do with truth, although this remainder is in fact the greater part and the more important one for human beings as such (scientists not excepted)." (1965:185) Scientism as thus defined and Monod's postulate of objectivity obviously come down to the same thing. Weil goes on to note that scientism either dismisses all questions of value to the sphere of subjectivity, where nothing can be truly or objectively known, or sees values as mere contingent facts of history to be causally explained, the view that he calls "historicism." By splitting facts from values, scientism also creates split personalities, especially among the well-educated in society, and it divides culture into two tightly sealed compartments—the one having to do with scientific explorations, and thus with knowledge proper, and the other involving arbitrary expressions of valuational opinion (*e.g.*, ethics, the arts, religion) which are ultimately meaningless because they lie beyond the bounds of knowledge. Science, regarded as the sole repository of truth, can do "an admirable job of pointing out both the conditions for success and the consequences of possible decisions," but a culture under the grip of scientism is left with no source of understanding when it comes to weighing the valuative dimensions of its options and decisions (1965:186). As a result, says Weil, "Science as interpreted by scientism. . . has become a disruptive factor in our culture on a profound, probably the profoundest level." (1965:185)

This last statement can be taken as a fitting summation of the arguments of this section, since the import of each of them is that the scientific view of nature, as undergirded by the attitude Weil calls scientism, must introduce profound disturbance into contemporary society by casting a nihilistic pall over all that is of greatest importance in human life. As we have seen, the scientifically inspired outlook and program of complete, all-encompassing objectivity undercuts our values, renders insignificant and irrelevant most of our conscious experience, and impugns our sense of purpose and freedom. We seem to be led to but one conclusion by the cosmic and moral nihilism implicit in the scientific description of nature and approach to value, as well as by science's over-all view of the place of human beings in the universe: human life is in all its essentials hopelessly and pathetically absurd.

II. Critical Discussion

There are at least three basic and highly debatable assumptions implicit in the arguments we have just considered. To take issue with them is to call into question the general line of argument from the scientific conception of nature to nihilistic despair of the meaning of human life.

The first assumption is that science and scientism come down to the same thing; that is, that the scientific outlook we have been discussing follows directly from scientific interpretations of nature; but to make this assumption is to fall into a category mistake. It is to confuse science with metaphysics, as though the task and scope of the two were one and the same. It is indisputable that science provides important evidence for metaphysics, but it is by no means obvious that its methods of investigation are the only reliable ones for gaining comprehensive knowledge about the nature of nature or the place of human beings in nature, or that they are competent by themselves to establish such knowledge. Even more to the point, the claim that they are—the claim of scientism—cannot be evaluated on scientific grounds. It is not a scientific claim, but a claim about the range and competency of science itself.

Scientism's explicit import is metaphysical, not scientific, since it makes allegations about the whole of reality, in all its aspects and dimensions. This means that scientism's assertions are philosophical and can be assessed only on philosophical grounds; they have no direct scientific warrant. There are other ways of viewing science and the metaphysical implications of its findings than the scientistic one. A defense or rejection of scientism is a defense or rejection of modern science, since they two are independent of one another. The arguments for nihilism which we have discussed are seriously weakened by their tendency to assume without argument that science and scientism amount to the same thing.

The second assumption is unquestioning acceptance of the notion that scientific interpretations of nature are completely impersonal and "objective." As we saw, it is assumed that scientific descriptions portray nature as it is in itself, nature as it would remain were human beings to be entirely removed from the scene. It is taken for granted that thes descriptions are, or can be, entirely formal and detached, arrived at independently of human biases or preconceptions, and

wholly uninfluenced by human purposes or values; but this assumption overlooks the fact that science is a human endeavor and, as such, the outcome of human perspectives, choices, and commitments. Any attempt to free it from this basis would amount to an attempt to undermine its own foundations.

This point could be defended in many ways; we will briefly indicate two ways of arguing for it here. We begin by noting a paradox implicit in Monod's restriction of reason to scientific reasoning. His act of restriction implies a capacity of reason to reflect on its own scope and significance, a capacity of self-awareness and self-criticism which Aristotle called "thinking on thinking;" but this reflexive power of reason, which Monod's plea for objectivity presupposes, belies his confinement of reason to strictly impersonal, formal modes of thought, since it is an informal power which encompasses and attributes significance to those very modes of thought. Monod is aware of this paradox and tries to take it into account, but he does not resolve it. He recognizes that science as he interprets it would be impossible without giving supreme *value* to the so-called "postulate of objectivity;" but since he insists that values can have no rational character or defense (by which he means they can admit of no *scientific* justification), he is driven to the conclusion that science, for him the sole paradigm of objective rationality, is grounded in a commitment which is completely subjective and nonrational. He is content to leave the matter there. So he does not so much resolve the paradox as cast it into bold relief. His inability to eliminate this paradox in his thinking should tip us off that something is fundamentally wrong with the scientistic attempt to restrict reason to scientific reasoning, and radically to separate fact from value.

The presence of this paradox in Monod's explication and defense of scientism gives confirmation to Barrett's allegation that formal techniques of reasoning have significance only in wider contexts of human belief, action, and purpose, showing that they are not as detached, self-sufficient, or all-encompassing as scientism thinks them to be. Barrett comments that "every technique is put to use for some end, and this end is decided in the light of some philosophic outlook or other. The technique cannot produce the philosophy that directs it." (1979:117) Weil makes a similar observation when he remarks that science is "possible only in a structured and meaningful world," a world where purpose and value play a fundamental role. He goes on to insist that "It is an absurd wish to reduce understanding to science," because "science is a human activity in a world that man *understands* and *understood* before he tried to *know* it scientifically." (1965:183, 185)

The import of this first argument, then, is that scientific knowledge is meaningless and inexplicable if taken by itself; it presupposes the broader background of understanding of which Barrett and Weil speak, and which even Monod is forced reluctantly to acknowledge, a background which is informal, valuative, and purposive. To restrict the scope of reliable reason to detached, formal, "objective" modes of thought is fatal to science itself, since it deprives it of any rational basis. Henry James' statement about the proponents of scientism in

in his own time is highly pertinent: "the blunder of the savants was in fancying that science *contained* rather than *being contained*. . . ." (paraphrased by Brooks 1932:176)

The second argument calls attention to the role of informal imagination and invention in the creation and confirmation of scientific theories, thus bringing into question from another direction the scientific claim to the complete objectivity of those theories. Fundamental theories of science are not simply "discovered" or read out of the world, nor are they typically arrived at on the basis of strict logic or exact algorithms. It is common for such theories to accord a central role to models, analogies, and conjectures which can only be regarded as free constructs of the creative imagination. Leon Brillouin states the point succinctly and well:

> As soon as we abandon the familiar ground of terrestrial experiments practiced on a human scale upon inanimate objects, our mind is suddenly faced with incomprehensible facts. The role of the imagination then becomes preponderant: astronomy, geology, ultimate particles or nuclei, finally biology—in all these fields strict logic is no longer sufficient. Down-to-earth reasoning fails, and imagination rules. (1964:45)

In fact, formal modes of reasoning, such as the various systems of mathematics, can be regarded as one type of model or imaginative construct, some versions of which have proved useful for interpreting certain aspects of experience. The invention of these mathematical models does not admit of formal derivation or explanation; it cannot be "objectively" accounted for.

Furthermore, since the network of theories believed to be true at any time helps to dictate the nature and significance of those "facts" which are called upon for their confirmation, not even the empirical confirmations of scientific theories can be said to be free from the coloration and influence of informal modes of reasoning, including not only the crucial imaginative factors in the theories themselves, but also the values, purposes, and decisions implicit in every phase of scientific theorizing. The putative facts, says Weil, depend "on the scientist's axioms, and the choice of these axioms is actually a choice, in other words, a value judgment." Hence, there is some deep sense in which "facts become relevant only through values." No theoretical choices "would be imaginable," he continues, "in a magma of facts, nor could there be choice under conditions of total value entropy." (1965:182–183). A moment's reflection should also convince us that facts can have significance only in the context of scientific inquiry taken as a purposive activity of human beings.

This brings us to a third basic assumption implicit in the arguments for nihilism discussed in the first section of this paper. That assumption is that the current scientific view of nature leaves us with only two alternatives, dualism or reductionism, neither of which, for reasons we have already considered, allows a mean-

ingful place to human beings in the natural order; but are these the only two options? Thinking that they are shows once again how easy it is to confuse science and metaphysics, as though science itself commits us to a particular metaphysical outlook, or to a particular set of metaphysical options.

To think this is to overlook the abstractness or selective focus of science and to forget that much of its exactitude, rigor, and success is bought at the price of its abstractness, *i.e.*, at the price of ignoring crucial aspects of human experience and awareness. This is the hidden tradeoff in "objective" modes of knowing. We have just been discussing how little justice scientific reason *per se* can do to the contexts of creative imagination, evaluation, and choice within which that reasoning operates and acquires its significance. Science as such need not focus on its own foundations or raise any ultimate philosophical questions. It is content to take those foundations for granted and to probe into the selected aspects of experience which its methods of inquiry are competent to illuminate, without needing to concern itself with the whole. By doing so, it has enjoyed considerable success, both in the way of theoretical understanding and of technological invention.

Metaphysics, by contrast, must aspire to do justice to the full complexity, range, and depth of human experience and thought—not only the sensate and mathematical aspects emphasized by natural science, but all the other aspects as well, aspects such as aesthetic insight and expression, the sense of moral value and responsibility, and the central existential challenges and concerns of human life. It is apparent, therefore, that it would be an egregious mistake to regard science, a discipline which is by its very method and approach limited and abstract, as constituting a comprehensive philosophy of nature and of the role of human beings in nature; but both dualism and reductionism, each in its own way, fall prey to this mistake, for both assume the complete metaphysical adequacy of the scientific description of nature. This mistake has plagued metaphysical thinking from the time of the scientific revolution to the present.

Dualism and reductionism fail as metaphysical interpretations, and not only because they lead to the *reductio ad absurdum* of nihilism. Another important measure of their failure is that neither is able to account for the possibility of science itself. Dualism fails because it tries to pack everything which is left out of the scientific interpretation of nature into a completely distinct order of being. As a consequence of its dichotomization of reality, it can give no explanation for the interaction between humans and nature which must be presupposed if we are to think ourselves capable of understanding anything about the natural order. Reductionism fails because it can give no significant role to the purposes and values implicit in the very act of scientific theorizing, a theorizing that makes sense only if it is the activity of beings who are free to weigh alternatives and to choose among them in light of reasons, and even more fundamentally, to value the process of free and rational inquiry.

There are other metaphysical approaches which can do greater justice to the possibility of science itself than either dualism or reductionism can. There is,

for example, the organic, emergentist model of nature and of the status of human beings in nature developed by Alfred North Whitehead. The model is neither dualistic or reductionistic. The distinction between human beings and other aspects of nature is one of degree, rather than kind; and yet, it is a distinction that can allow a fundamental role to consciousness, value, and freedom. It is both "panpsychist" and panphysicalist" in its conception of nature and of the whole of reality, thus breaking down the hard-and-fast distinction between these two realms argued for by dualism. It posits no rigid separation of fact and value, causality and freedom, but seeks to illuminate the dialectical interplay of these factors in experience. It gives an important place to the findings of science in the construction of its theory of reality, but it regards those findings as only one important source of evidence. Thus it can draw extensively on the results of science without succumbing to scientism.

Whitehead's metaphysical vision is not without its problems, but I would argue that it more closely approximates what a coherent and adequate metaphysical scheme would need to accomplish than does either dualism or reductionism. My purpose here, however, is not so much to defend the superiority of this scheme as to call attention to it as one important alternative which is overlooked when we assume that dualism or reductionism are the only two options made available to us by the scientific perspective on nature. There are other metaphysical alternatives which could also be discussed, but mention of this one should suffice to make the point.

Our whole enterprise in this paper has been informed by John Dewey's suggestion that the most promising way out of the "snarl" of any complex problem "is a reconsideration of the conceptions in virtue of which the problem exists," for these conceptions enter tacitly, and often quite unconsciously, into the formulations of the problem itself (1958:252). If we take seriously the debatability of some of the assumptions built into the arguments from the methods and discoveries of modern science to the nihilistic outlook on human life, I think that much of the disruptive force of these arguments will be dissolved and that they will come to be seen in a different, more critical light. Such arguments are by no means the only source of nihilism in our time, but they do represent one important source, often not so much explicitly stated or developed as viscerally felt; for ours is not only an age of science; it tends to be an age of scientism as well.

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