An Introduction to Process Cosmology

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In speaking of "process cosmology," I refer to cosmological thinking in the tradition of Alfred North Whitehead (1861-1947). The use of the label "process" for Whitehead's position is derived from the title of his major work, *Process and Reality*, which he wrote in the late 1920s after coming to Harvard University to begin teaching philosophy.

Whitehead had been educated at Cambridge University, where he wrote a dissertation on Maxwell's *Treatise on Electricity and Magnetism* in 1884 and then taught mathematics, including mathematical physics, until 1910. In some circles, Whitehead is best known for the major work of this period, *Principia Mathematica,* which he co-authored with his former pupil Bertrand Russell. In the next period of his life, spent in London, Whitehead increasingly devoted himself to what he called the philosophy of nature, writing, among other things, an alternative to Einstein's theory of relativity.

After coming to Harvard in 1924, he turned to metaphysics, which, as he understood the term, differed from philosophy of nature by including the human subject within the scope of that which is to be explained. The new concern with metaphysics did not, however, signal any lessening of interest in the cosmological concerns with which he had been occupied during his London period. *Process and Reality* is, in fact, subtitled *An Essay in Cosmology*.[1] Although it goes beyond the cosmological issues discussed in his philosophy of nature, it includes them.

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[1]Alfred North Whitehead, *Process and Reality: An Essay in Cosmology,* corrected edition, ed. David Ray Griffin and Donald W. Sherburne (New York: Free Press, 1978 [original ed. 1929]).

We can surely take that work and Whitehead's other books of this period as embodying his own formal proposals as to the principles a cosmology should exemplify. If so, we can say, in the first place, that cosmological thinking, rather than being either exclusively philosophical or exclusively scientific, should be equally philosophical and scientific.

1. Cosmology as both Philosophical and Scientific

The fact that a cosmology must be scientific is obvious, because a purely philosophical cosmology would be self-contradictory. That is, the basic formal criteria of philosophy are logical consistency and adequacy to the relevant facts, and the most obviously relevant facts for cosmology are the facts about our cosmos discovered by the physical sciences. To fulfill its own criteria, therefore, a philosophical cosmology must include the sciences. In Whitehead's own words, "it is the business of a cosmology to be adequate," so it must "include all the sciences." (FR 77)

While that point is widely accepted, the opposite point---that cosmology must be philosophical as well as scientific---is in our age widely denied, at least in practice. But science is supposed to be both a rational and an empirical enterprise. The development of a scientific cosmology must, accordingly, adhere to the basic principles of rationality: self-consistency and adequacy to the relevant facts.

This point is, of course, accepted in the scientific community. But members of this community often have a very limited notion of the relevant facts to which a cosmology must be adequate. This is most clearly the case insofar as cosmology is equated with an enterprise called "physical cosmology," understood as a branch of astrophysics.

But even when that equation is not made, the scientific cosmologist is generally seen as under no obligation to do justice to a wide range of facts about our universe, including the emergence of human beings, with their capacity for religious, moral, aesthetic, and logical experience and their capacity for mathematical, scientific, and philosophical reasoning. Whitehead, with such arbitrary restrictions in mind, chided: "It is easy enough to find a theory, logically harmonious and with important applications in the region of fact, provided that you are content to disregard half your evidence."

Such disregard is both anti-scientific and anti-philosophical, Whitehead said, because "[t]he rejection of any source of evidence is always treason to that ultimate rationalism which urges forward science and philosophy alike." (FR 61)What is needed, emphasized repeatedly, is "the retention of the whole of the evidence in shaping our cosmological scheme." (SMW 187). And since it is the business of cosmology to be adequate to the whole of the evidence about our cosmos, it must also "consider those factors which have not been adequately embraced in some science" (FR 77)---factors such as our moral and religious experiences.

This conception of cosmology has two implications for the relation between cosmology in Whitehead's sense, which we can call philosophical cosmology, and the scientific endeavor known as physical cosmology. First, philosophical cosmology is much broader enterprise, which should integrate the evidence from all the sciences, including biology and human psychology. Physical cosmology, therefore, is simply one of the parts of cosmology as such. Second, a philosophical cosmology "should not confine itself to the categoreal notions of one science, and explain away everything which will not fit in." (86) This means that physical cosmologists should not dogmatically insist that their enterprise can be equated with cosmology as such on

the grounds that, if some putative fact cannot be adequately treated within their scheme of ideas, then that putative fact is not a *real* fact.

The proper relation for physical and philosophical cosmology is for them to be critics of each other.

> The cosmological scheme should present the genus, or which the special schemes of the sciences are the species. . . . A special scheme should either fit in with the general cosmology, or should by its conformity to fact present reasons why the cosmology should be modified. In the case of such a misfit, the more probable result is some modification of the cosmology and some modification of the scheme in question. Thus the cosmology and the schemes of the sciences are mutually critics of each other. (FR 77)

It is obvious cosmology in the inclusive sense must be modified whenever such modification is necessary to make the cosmology consistent with each of the sciences. It is equally true, however, that that the basic ideas employed in physics and chemistry need to be modified whenever such modification is necessary to make these ideas consistent with philosophical cosmology---assuming, of course, the availability of a cosmology that is both self-consistent and reasonably adequate to all the known facts of our cosmos. Why? Because we must assume that everything in our cosmos is interconnected and mutually consistent. So if the ideas used in one of the sciences is inconsistent with various facts about our cosmos not discussed by that science, then this scheme of ideas will not be adequate even for the phenomena treated by that special science.

For example, if human beings have a degree of genuine freedom, meaning that their behavior is not fully determined by antecedent causes but involves an element of final causation, in the sense of self-determination in the moment,

then an adequate human psychology will be inconsistent with a physical cosmology that portrays causal relations at the atomic and subatomic level in a purely mechanistic way, involving nothing but efficient causation. Or, to be more precise, these two accounts will be inconsistent assuming that the cosmology does not include the notion of a supernatural agent, through which the emergence of self-determining beings in a previously wholly mechanistic universe can be explained. This brings us to the next principle exemplified in Whitehead's cosmology, which is that cosmological thinking should be wholly and consistently naturalistic.

2. Cosmology as Naturalistic (Nonsupernaturalistic)

By saying that a cosmology should be naturalistic, I mean that it should not allow for any interruptions of the world's normal causal principles. This principle, which was embodied in Greek science, was---after a long period in which science was carried out within the framework of Christian supernaturalism---recovered in the eighteenth century in France and the nineteenth century in the English-speaking world. The difficulty in overcoming the appeal to supernatural assistance was illustrated by Charles Lyell, known as the father of uniformitarianism. Although uniformitarianism is the doctrine that we should never explain any phenomenon by appealing to some causal factor that is not presently observable, Lyell violated this dictum in relation to the human mind, saying that to explain its origin we must "assume a primeval creative power which does not act with uniformity." Divine intervention, Lyell maintained, added "the moral and intellectual faculties of the human race, to a system of nature which had gone on for millions of years without the intervention of any analogous cause" (Hooykaas NL 114).

Darwin, like Lyell, believed in a divine creator. But Darwin insisted on holding consistently to the deistic view that the creator, having once created our universe, did not intervene thereafter. In rejecting Lyell's view, Darwin wrote:

> If I were convinced that I required such additions to the theory of natural selection, I would reject it as rubbish. . . . I would give nothing for the theory of Natural Selection, if it requires miraculous additions at any one stage of descent.[2]

Since the time of Darwin, the idea that science presupposes a consistently naturalistic cosmology has become commonplace. Indeed, even Darwin's deism is now rejected, and rightly so, because it was itself a violation of uniformitarianism, assuming a kind of causation at the beginning of our universe different in kind from any presently observable causation

Whitehead's endorsement of a fully naturalistic cosmology is illustrated by his statement that "the full scientific mentality . . . instinctively holds that all things great and small are conceivable as exemplifications of general principles which reign throughout the natural order," so that "every detailed occurrence can be correlated with its antecedents in a perfectly definite manner, exemplifying general principles" (SMW 5, 12). Whitehead's naturalism is also illustrated in his rejection of the early modern appeal, illustrated by Leibniz and Berkeley, "to a *deus ex machina* who was capable of rising superior to the difficulties of metaphysics" (SMW 156). Whitehead's implied recommendation is that, if you find that you cannot explain certain features of our world without appealing to a

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[2] Francis Darwin, ed., *The Life and Letters of Charles Darwin,* 2 vols. (New York: D. Appleton, 1896), II: 6-7.

supernatural interruption of the world's normal causal principles as entailed by your metaphysics, change your metaphysics!

However, although the term "naturalism" most readily suggests only this rejection of supernaturalism, the term has become widely used to refer to a specific type of naturalism that is much more restrictive. This specific type of naturalism, widely thought to be required by science, has a sensationist doctrine of human perception, according to which our physical senses provide our only means of perception; a materialistic doctrine of nature, including human beings; and an atheistic doctrine of the universe as a whole. This doctrine can be called for naturalism$_{sam}$, with "sam" standing for

Although this sensationist-atheistic-materialistic type of naturalism is widely referred to simply as "naturalism," this is a category mistake. Naturalism as such, or generic naturalism, is limited to the doctrine that there are no supernatural interruptions of the world's normal causal processes. This generic doctrine can be called naturalism$_{ns}$, meaning nonsupernaturalistic naturalism. This generic naturalism has many species, only one of which is naturalism$_{sam}$. To refer to this type of naturalism without a specifying adjective, thereby equating it with naturalism as such, is to conflate a genus with one of its species.

Besides not being identical with naturalism as such, moreover, naturalism$_{sam}$, unlike naturalism$_{ns}$, is not required by science. Some contemporary exponents of naturalism$_{sam}$, such as Richard Dawkins, to be sure, argue that science requires atheism. However, what they really mean, or should mean, is only that any form of theism, to be compatible with naturalism$_{ns}$, must be a version of naturalistic theism, according to which the divine reality never interrupts the world's normal causal principles. The same is true of the other two components of naturalism$_{sam}$,

namely, sensationism and materialism. Although some philosophers and scientists have argued that they are required by science, they are not.

3. The Inadequacy of Naturalism$_{sam}$

From a Whiteheadian perspective, in fact, we can see that naturalism$_{sam}$, far from being required by a science-based cosmology, are not even compatible with one---at least not one that can achieve a high degree of adequacy and self-consistency. I will give a few examples.

The Mind-Body Problem

A major problem for modern philosophy and science has been that of how our minds, with their conscious experiences, are related to our bodies, most immediately our brains. The problem has been created by the materialistic doctrine of nature, according to which the ultimate units of the world are what Whitehead calls "vacuous actualities," meaning entities that, while actual, are wholly devoid of experience. The traditional question, raised for example Descartes' dualistic cosmology, is how minds, with their experience, could interact with brain cells, which are different in kind by being completely devoid of experience. Descartes and his followers could answer this question only by appeal to God, thereby illustrating William James' observation that, "For thinkers of that age, 'God' was the great solvent of all absurdities."[3]

A more recent question, evoked by the rise of the evolutionary perspective on our origins, is how minds could have emerged at some point in a process that, prior to that time, involved entities wholly devoid of experience. Richard

[3] William James, *Some Problems of Philosophy* (London: Longman & Green, 1911), 194.

Swinburne, repeating the Cartesian answer, says that although "science cannot explain the evolution of a mental life," because "there is nothing in the nature of certain physical events . . . to give rise to connections to [mental events], . . . God, being omnipotent, would have the power to produce a soul."[4]

Most dualists today, however, agree that this supernaturalist solution is no longer acceptable, and some of them have frankly admitted that, not being able to give that answer, they can give no answer at all. For example, Geoffrey Madell, admitting that "the nature of the causal connection between the mental and the physical, as the Cartesian conceives of it, is utterly mysterious,"[5] adds that "the appearance of consciousness in the course of evolution must appear for the dualist to be an utterly inexplicable emergence of something entirely new, an emergence which must appear quite bizarre."[6]

Although many materialists have used the mind-body problem as a battering ram against dualism, some materialists have admitted that their own position faces the same difficulties. With regard to the mind-brain relation, McGinn says that it is impossible to explain how "the aggregation of millions of individually insentient neurons [constituting the brain could] generate subjective awareness."[7] With regard to the problem of evolutionary emergence, he says:

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[4]Richard Swinburne, *The Evolution of the Soul* (Oxford: Clarendon, 1986), 198-99. Although Swinburne is a dualist, he sees that this problem is the same whether one is a dualist or a materialist.

[5] Geoffrey Madell, *Mind and Materialism* (Edinburgh: The University Press, 1988), 2 .

[6]Ibid., 140-41.

[7]Colin McGinn, *The Problem of Consciousness: Essays Toward a Resolution* (Oxford: Basil Blackwell, 1991), 1.

> we do not know how consciousness might have arisen by natural processes from antecedently existing material things. Somehow or other sentience sprang from pulpy matter, giving matter an inner aspect, but we have no idea how this leap was propelled.

The crucial point in McGinn's statement is that we do not know how consciousness could have arisen by means of *natural* processes. "One is tempted," he adds,

> to turn to divine assistance: for only a kind of miracle could produce *this* from *that.* It would take a supernatural magician to extract consciousness from matter. Consciousness appears to introduce a sharp break in the natural order--a point at which scientific naturalism runs out of steam.[8]

In speaking of "scientific naturalism" here, McGinn means what I have called naturalism$_{sam}$. But this recognition that this version of naturalism cannot explain the mind-body relation does not lead him to look for another version. He instead says that we simply have to accept the fact that the existence of our own consciousness will forever remain a mystery.[9]

Another dimension of the mind-body problem is the question of how human freedom is possible. Philosopher John Searle provides an especially clear example of the dilemma created

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[8]Ibid., 45.

[9] Drawing upon Noam Chomsky's distinction between "problems," which human minds are in principle capable of solving, and "mysteries," which in principle elude our understanding, McGinn says: "The mind-body problem is a 'mystery' and not merely a 'problem'" (PC 29). Saying that "it remains a mystery . . . how mere matter could form itself into the organ of consciousness. (PC 213) "I think the time has come," adds McGinn, "to admit candidly that we cannot resolve the mystery" (PC viii).

by the materialism of naturalism$_{sam}$. Searle, on the one hand, points out that we cannot live without presupposing that we have a degree of freedom. "Our conception of ourselves as free agents," says Searle, "is fundamental to our overall self-conception."

On the other hand, Searle believes that we cannot really be free, since the world, of which we are parts, does work as "a determined physical system." Science, he says, "allows no place for freedom of the will,"[10] because science teaches that the world "consists entirely of mindless, meaningless, physical particles."[11] As that statement implies, Searle, as a materialist, holds the position called "identism," according to which the mind is identical with the brain.[12] He concludes, therefore, that human behavior is to be explained, like the behavior of all aggregations of physical particles, in terms of bottom-up causation, which means that "the psychological facts about ourselves, like any other higher level facts, are entirely causally explicable in terms of . . . elements at the fundamental micro-physical level."[13] The causal relations behind our experiences are, therefore, entirely a matter of neurons and neuron firings at synapses."[14] Consciousness, as an emergent property of the brain, cannot "cause things that could not be explained by the causal behavior of the neurons."[15]

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[10]John R. Searle, *Minds, Brains, and Science: The 1984 Reith Lectures* (London: British Broadcasting Corporation, 1984), 92.

[11]Ibid., 13.

[12]John R. Searle, *The Rediscovery of the Mind* (Cambridge: MIT Press, 1992), 248.

[13]*Minds, Brains, and Science*,98.

[14]Ibid., 93.

[15]*The Rediscovery of Mind,* 63.

After saying all this, nevertheless, Searle says that "no matter how much we learn about how the world works as a determined physical system," "we can't act otherwise than on the assumption of freedom"[16]---with freedom meaning "that we could have done things differently from the way we did in fact do them."[17] Searle's discussion shows that the equation of naturalism$_{sam}$ with the scientific worldview leads to a most unsatisfactory conclusion: Although we cannot help presupposing that we are free, we must attempt to believe that we are not---an attempt that, of course, presupposes that we *are*.[18]

Knowledge of Nonphysical Entities

Another reason why naturalism$_{sam}$ is inadequate is that our scientific and philosophical thinking presuppose that we have knowledge of various types of entities that, if naturalism$_{sam}$ were true, could not be known by us and could not even exist. These entities include the objects of mathematical, logical, and moral thought.

Mathematics: Physics, often considered the premier science, presupposes mathematics. And yet if naturalism$_{sam}$, with its sensationism and atheism were true, mathematics would be impossible.

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[16]Ibid., 86, 97.

[17]*Minds, Brains, and Science*, 92. A similar analysis of the problem of freedom and determinism is provided by Thomas Nagel, who says that he cannot help holding himself and others responsible but can see no coherent way to affirm responsible (incompatibilist) freedom (*The View from Nowhere* [New York: Oxford University Press, 1986], 110-23).

[18]Searle, *Minds, Brains, and Science*, 5, 94, 98. I have discussed Searle's position on freedom more fully in *Unsnarling the World-Knot: Consciousness, Freedom, and the Mind-Body Problem* (Berkeley: University of California Press, 1998), 38-40, 163-70, and in *Religion and Scientific Naturalism: Overcoming the Conflicts* (Albany: State University of New York Press, 2000), 151-57.

This problem has recently been illustrated in the thought of Willard Quine, one of America's leading philosophers of science of recent decades. Quine insisted emphatically on the importance for ontology of the sensationist doctrine of perception, saying that nothing should be allowed in our ontology that cannot pass the "tribunal of sense experience."[19] However, recognizing that mathematical sets are indispensable for physics, Quine made an exception for them.

This radical inconsistency in his philosophy could have been avoided if he, recognizing that we must somehow be capable of perceiving numbers, had followed the lead of the great mathematician Kurt Gödel, who suggested that our knowledge of mathematical objects comes through a nonsensory type of perception, which we call "mathematical intuition."[20] The scorn evoked by this suggestion, however, shows how firmly the sensationist doctrine help by contemporary philosophers. Charles Chihara asked: "What empirical scientist would be impressed by an explanation this flabby?"[21] Hilary Putnam, insisting that "we think with our brains, and not with immaterial souls," declared: "We cannot envisage *any* kind of neural process that could even correspond to the 'perception of a mathematical object.'"[22] So the problem has gone unsolved. Quine, like these other philosophers, simply could not take seriously the idea of a nonsensory mode perception. So he simply continued to insist

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[19]Willard Quine, *From a Logical Point of View* (Cambridge: Harvard University Press, 1953), 41.

[20] Kurt Gödel, "What is Cantor's Continuum Problem? Supplement to the Second [1964] Edition." In *Collected Works,* Vol. II, edited by Solomon Feferman et al. New York: Oxford University Press, 1990: 266-69, at 268.

[21] "A Gödelian Thesis Regarding Mathematical Objects: Do They Exist? And Can We Perceive Them?" *Philosophical Review*, 91 (1982): 211-17.

[22] Hilary Putnam, *Words and Life*, edited by James Conant (Cambridge: Harvard University Press, 1994), 503.

on his tribunal of sense perception while allowing numbers slip in the back door.

This allowance resulted in an ontology that was, as Quine himself put it, "materialism, bluntly monistic except for the abstract objects of mathematics,"[23] which exist "over and above the physical objects"?[24]

But how is this conceivable? How and where would these abstract, nonactual entities exist in an atheistic universe. And if they could somehow exist in the void, as it were, how could they exert causal influence on us? This question is crucial, because to perceive some entity is possible only if that entity is exerting influence on us, as when photons coming from the moon allow us to perceive it. But how could numbers exert influence. As philosopher of mathematics Penelope Maddy writes: "[H]ow can entities that don't even inhabit the physical universe take part in any causal interaction whatsoever? Surely to be abstract is to be causally inert."[25]

The traditional answer to both of these questions---where mathematical forms exist and how they exert causal influence on our minds---was that they existed in an all-pervasive actuality. But philosophers who accept $\text{naturalism}_{\text{sam}}$ cannot give this answer. As philosopher of mathematics Reuben Hersh points out, "For Leibniz and Berkeley, abstractions like numbers are thoughts in the mind of God. . . . [But] the Mind of God [is] no longer heard of in academic discourse."[26]

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[23]Quine, *From Stimulus to Science* (Cambridge: Harvard University Press), 14.

[24]Quine, *Theories and Things* (Cambridge: Harvard University Press, 1981), 14-15.

[25]Penelope Maddy, *Realism in Mathematics* (Oxford: Clarendon Press, 1990), 37.

[26]Reuben Hersh, *What is Mathematics, Really?* (New York: Oxford University Press, 1997), 12.

How did Quine respond to all these problems in his position? By ignoring them. As Quine's Harvard colleague Hilary Putnam put it, Quine simply "ignore[d] the problem as to how we can know that abstract entities exist unless we can interact with them in some way."[27] Simply ignoring a radical inconsistency in one's cosmology, however, is not an acceptable approach in either science or philosophy.

Logic: As Putnam has pointed out, the idea of mathematical knowledge is in the same boat with the idea of logical knowledge, so $\text{naturalism}_{\text{sam}}$ equally implies that we could have no knowledge of logical truths.[28] Philosopher Colin McGinn illustrates this problem in terms of the logical principle known as *modus ponens*, which says:

> If P, then Q.
> P.
> Then Q.

The question, as McGinn phrases it, is "how a physical organism can be subject to the norms of rationality. How, for example, does *modus ponens* get its grip on the causal transitions between mental states."[29]

This problem is acute for McGinn because, as a materialist, he takes billiard-ball causation as paradigmatic for causation in general.[30] But causation exerted on the brain by norms, which are *abstract* entities, would be different in kind from causation between billiard balls. "[C]ausal relations between . . . abstract entities

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[27]Putnam, *Words and Life*, 153.

[28] Ibid., 500.

[29]McGinn, *The Problem of Consciousness*, 23n.

[30]Ibid., 55.

and human minds," McGinn can only conclude, would be "funny kinds of causation."[31] McGinn, providing no solution to this problem, thereby illustrates Hilary Putnam's charge that most science-based philosophies are self-refuting, because they "leave no room for a rational activity of philosophy."[32]

Moral Knowledge: The problems created for $\text{naturalism}_{\text{sam}}$ by mathematical knowledge are equally created by moral knowledge. We all presuppose that we know certain moral truths, such as: "It is wrong to inflict pain on others simply for fun." But philosophers who have accepted $\text{naturalism}_{\text{sam}}$ conclude that we really cannot regard such ideas as knowledge.

For example, John Mackie, giving an argument from "queerness," said that all of our knowledge about things beyond our own minds (which we know through introspection) comes through sensory perception. But if were to have knowledge of objective moral values, "it would have to be by some special faculty of moral perception or intuition, utterly different from our ordinary ways of knowing," and this would simply be too queer to be believable.[33]

Gilbert Harman, also presupposing that all perception is by means of our physical sense organs, considers moral knowledge impossible on the grounds that "there does not seem to be any way in which the actual rightness or wrongness of a given situation can have any effect on your perceptual apparatus."[34]

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[31] Ibid., 55, 53.

[32] Hilary Putnam, *Realism and Reason* (New York: Cambridge University Press, 1983), 191.

[33] John Mackie, *Ethics: Inventing Right and Wrong* (New York: Penguin, 1977), 38-39.

[34] Gilbert Harman, *The Nature of Morality: An Introduction to Ethics* (New York: Oxford University Press, 1977), 8.

On the basis of their atheism, moreover, these philosophers even deny that moral values could have objective existence. Harman, characterizing scientific naturalism as "the sensible thesis that *all* facts are facts of nature,"[35] says: "Our scientific conception of the world has no place for gods" and hence "no place for [objective values]."[36] Mackie, granting that if a divine actuality existed, "a kind of objective ethical prescriptivity could be defended," he described his book on ethics as "a discussion of what we can make of morality without recourse to God."[37] His conclusion was not much---as shown by his statement that nothing in the nature of things says that, "if someone is writhing in agony before your eyes," you should "do something about it if you can."[38]

Harman, summarizing the twofold way in which $\text{naturalism}_{\text{sam}}$ rules out the possibility that our moral convictions could involve knowledge of objective moral principles, says: "our scientific conception of the world has no place for entities of this sort, and . . . there is no way in which we could become aware of such entities."[39] Some people, seeing this implication, seem willing to give up the idea of moral knowledge once they see that it is ruled out by $\text{naturalism}_{\text{sam}}$, which they assume to be the scientific worldview. As we have seen, however, $\text{naturalism}_{\text{sam}}$, if applied consistently, would provide the same twofold proof

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[35]Ibid., 17.

[36]Harman, "Is There a Single True Morality?" In *Relativism: Interpretation and Confrontation*, ed. Michael Krausz (Notre Dame: University of Notre Dame Press, 1989): 363-86., at 381, 365-66.

[37]Mackie, *Ethics*, 48.

[38]Ibid., 79-80.

[39] Harman, "Is There a Single True Morality?" 366.

that we could not have mathematical and logical knowledge---two kinds of knowledge presupposed by science itself.

4. Whitehead's Naturalism$_{ppp}$

As we have seen, Whitehead believed that cosmology must be fully naturalistic. However, also believing that it must be adequate to the relevant facts in a self-consistent way, he held that the currently reigning version of naturalism, which I have dubbed naturalism$_{sam}$, needed to be replaced with a new version. He then developed a new version, which I have called naturalism$_{ppp}$, meaning prehensive-panentheist-panexperientialist naturalism. In this new version, the sensationist doctrine of perception is replaced by a prehensive doctrine; the atheistic view of the universe is replaced by panentheism; and the materialistic doctrine of nature is replaced by panexperientialism. I will briefly suggest how the afore-mentioned problems of naturalism$_{sam}$, are overcome by this new version of naturalism, beginning with its panexperientialism.

Panexperientialism

Panexperientialism, which literally mean "all things have experience," might be taken to mean that things such as sticks, stones, and computers are experiencing individuals, analogous to squirrels and human beings. Thus understood, panexperientialism would have little to commend it, since sticks, stones, and computers, show no signs of spontaneity, which we generally use as evidence that experience is present. Whitehead's version of panexperientialism, however, says only that all *genuine individuals* have at least some iota of experience, and the criterion for deciding which things are genuine individuals is whether they show signs of

spontaneity. Sticks and stones do not; amoebae, bacteria, macromolecules, and electrons do.

Genuine individuals are of two types. The most elementary units of nature are *simple* individuals. All higher-level individuals are *compound* individuals, which are organized so as to support the emergence of a higher-level experience, which in animals we call its mind, psyche, or soul. Compound individuals are hence categorically different from things such as sticks and stones, which are mere aggregational societies, because no experience higher than those of the billions of molecules emerges. This distinction is so important that Whitehead's position should be called not simply "panexperientialism" but "panexperientialism with organizational duality."

The main point to emphasize here, in any case, is that experience goes all the way down, to the most elementary units of nature. Whiteheadian panexperientialism, therefore, does not need to answer the question, fatal to both materialism and dualism, of how conscious experience emerged out of things wholly devoid of experience. There is, to be sure, genuine emergence, but it is the emergence of higher forms of experience---eventually conscious and then self-conscious experience---out of lower forms, not the emergence of experience out of vacuous actualities, which would require supernatural assistance.

This doctrine also solves the problem of mind-brain interaction, because we no longer have to wonder how sentient and insentient entities can interact. Brain cells are, like bacteria and amoebae, experiencing individuals. So the brain cells can feel the mind's feelings, which can in turn feel the feelings of the brain cells. Like dualism, this position affirms mind-brain interaction. But it is not dualistic interaction, which is unintelligible. It is, instead, nondualistic interaction.

This position can also explain our freedom. Although all genuine individuals have some degree of spontaneity or

freedom, it would be very minimal in subatomic particles, atoms, molecules. The most important development in the evolutionary process can be understood as the emergence of more and more complex compound individuals, which have greater and greater degrees of freedom as part of their higher and higher forms of experience.

Panentheism

In naturalism$_{ppp}$, the atheism of naturalism$_{sam}$ is replaced by a panentheistic cosmology, according to which the universe, in the sense of the totality of finite things, exists within God, understood as the soul of the universe. The doctrine allows us to reaffirm the old idea that mathematical entities, logical principles, and moral ideals can both exist and have causal efficacy on our experience because they exist in a nonlocal agent. This issue was, in fact, central to Whitehead's turn to theism. The crucial principle leading to this turn was what he called the "ontological principle," which says that "apart from things that are actual, there is nothing--nothing either in fact or in efficacy."[40] In other words, nonactual things cannot exert causal efficacy or even exist except by being in actual things. Whitehead hence placed mathematical, logical, and moral ideals in what he called the "primordial nature" of God. Also calling this primordial nature "the Eros of the Universe," Whitehead described is as "the active entertainment of all ideals, with the urge to their finite realization, each in its due season."[41]

We, in other words, can perceive ideal entities by virtue of perceiving the all-pervasive actual entity in which subsist. In Whitehead's words: "There are experiences of ideals--of ideals entertained, of ideals aimed at, of

[40]Whitehead, *Process and Reality*, 40.

[41]Whitehead, *Adventures of Ideas*, 11, 277.

ideals achieved, of ideals defaced. This is the experience of the deity of the universe."[42]

The fact that God exerts influence in the world does not, however, make panentheism a version of supernaturalistic theism, because this divine influence is understood as part and parcel of the world's normal causal relations, never an interruption thereof. Whiteheadian panentheism is a version of what can equally be called naturalistic theism or theistic naturalism.

Besides not violating naturalism_{ns}, moreover, this doctrine, with its denial of even the possibility of divine interruptions, is not undermined by the problem of evil.[43]

Prehensive Perception

However, the idea that we can perceive God may seem to be a problem. It certainly would be, if Whitehead had retained the sensationist doctrine of perception. He, however, replaced it with a prehensive doctrine of perception, according to which sensory perception is a high-level form of perception, derivative from a more fundamental, nonsensory mode of perception.

This doctrine, besides solving many of the standard problems created by the sensationist doctrine of perception (which I have not had time to discuss in this lecture),[44] allows us to understand how we can be influenced by, and become conscious of, the objects of mathematical, logical,

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[42] Whitehead, *Modes of Thought,* 103.

[43] I have discussed the problem of evil in *God, Power, and Evil: A Process Theodicy.* Philadelphia: Westminster Press 1976; reprinted with a new preface, Louisville: Westminster John Knox, 2004); *Evil Revisited: Responses and Reconsiderations* (Albany: State University of New York Press, 1991; and "Creation out of Nothing, Creation Out of Chaos, and the Problem of Evil," *Encountering Evil: Live Options in Theodicy*, ed. Stephen T. Davis, 2nd edition (Louisville: Westminster John Knox, 2001), 108-25.

[44]

and moral judgments. It also allows us to take reports of theistic religious experience seriously.

5. God, Creation, and Evolution

I will conclude by briefly indicating the implications of Whitehead's panentheism for two questions: whether the universe is eternal or created in time, and how it relates to the contrast between Neo-Darwinian Evolution and Intelligent Design.

Eternal or Created in Time

On the two basic views about the universe---that it is eternal or that it was created in time---Whitehead held both.

On the other hand, he held, with Plato, that our particular world is a contingent creation, which started coming into existence at some particular time in the past. On the other hand, he did not accept the view, which has widely but falsely been thought to be the biblical view, that our world was created *ex nihilo* in the sense of absolute nothingness. He explicitly rejected the "theology of a wholly transcendent God creating out of nothing an accidental universe" (PR 95). Whitehead instead reaffirmed Plato's view that the creation of our world "is not the beginning of [finite] matter of fact but the incoming of a certain type of social order" (PR 96). The creation of our world several billion years ago was not the beginning of the realm of finitude; it was merely the beginning of our "cosmic epoch" (PR 91).

This position can be made clear by distinguishing between *the* universe and our particular universe. *The* universe, in the sense of a realm of finite actualities, has always existed. This point is implicit in the doctrine of panentheism, according to which it belongs to the very

nature of God to be in relation to a world of finite beings. The universe in this sense is eternal and necessary. The principles by which its entities causally interact with each other and with God are metaphysical principles, which means that they obtain necessarily. As such, they cannot be interrupted.

By contrast, our particular universe---our cosmic epoch---is a contingent creation. It embodies various principles---cosmological principles----that are contingent. But our particular universe, being a cosmic epoch of the eternal universe, embodies all the metaphysical principles. Even the contingent cosmological principles, accordingly, embody necessary metaphysical principles.

Here we have the fundamental difference between naturalistic theism (of this type) and supernaturalistic theism. In the latter, all the "laws of nature," including the most fundamental causal principles, were freely created by God and hence could be freely interrupted. It is this form of theism that has created the impression that belief in God, besides being refuted by the problem of evil, is also antithetical to a scientific outlook.

In supernaturalistic theism, all power essentially belongs to God; any power possessed by the creatures is, as it were, on loan to them and could hence be overridden at any time. This means that divine power is coercive, controlling, unilateral power, which can unilaterally determine what happens in the world.

In Whitehead's naturalistic theism, by contrast, power belongs to creatures as naturally as it does to God. This power, called by Whitehead "creativity," involves the twofold power of final causation (self-determination) and efficient causation (exerting influence on others). Divine power is hence persuasive power---the power to influence creatures, not the power to determine their states and behavior unilaterally.

This naturalistic theism is, therefore, avoids an embarrassing question created for supernaturalistic theism by the discovery of the evolutionary nature of our world. If God could have created the world in its present state in the twinkling of an eye, as supernaturalistic theism implies, why would God have taken some 14 billion of years, during most of which there were no higher forms of life or even any life whatsoever. This evolutionary picture is, however, fully consonant with the idea of a creator who does not create any species *ex nihilo* but gradually persuades the creation in the direction of higher forms of existence.

Neo-Darwinian Evolution and Intelligent Design

In the dispute between these two positions, Whiteheadian cosmology stakes out a middle position.

On the one hand, it obviously rejects Intelligent Design, insofar as that position embodies supernaturalistic theism and hence is at least open to the rejection of macroevolution in favor of the special creation, *ex nihilo*, of each species.

On the other hand, Whiteheadian panentheism rejects those aspects of Neo-Darwinism that presuppose atheism. Central here is the insistence that evolution is to be understood entirely in terms of natural selection based on random variations, which entails that the evolutionary process is an entirely undirected, ultimately meaningless, process. Whitehead, believing that evolution has clearly manifested an upward trend and that this trend needs explanation (FR 24), portrayed God as influencing the process to develop more complex organisms capable of supporting forms of experience that could actualize ever higher values.