

CHAPTER 1



Process Philosophy

Introduction

Rome. The year is 1600. Imagine yourself as part of a crowd that has gathered in the Plaza San Marco to witness the burning of a heretic at the stake. An upstart astronomer, Giordano Bruno, has made the ridiculous claim that Earth goes around the Sun. Everyone you know agrees that Earth is the center of the universe and that the Sun and the planets go around Earth. This troublemaker has absolutely no respect for church authority and for a tradition going back to Greek times. Additionally he espouses doctrines of pantheism instead of the one God that we all profess. He must be publicly silenced.

Such was the power of the church in matters of science and theology when observations produced the Copernican model of the solar system. It was fortunate for Copernicus that he died only a few months after revealing his model. For while it is true that theological disputes among Christians took thousands of lives, whereas church disputes with scientists were relatively rare, nevertheless scientists soon learned that it was better to quietly ignore the church and to go their own way.

Another Italian, Galileo Galilei, made his own observations with his new telescope and came to the same conclusions as Bruno and Copernicus. Papal authority forced him to recant publicly—or else. Up to these times the church had been the custodian of science, preserving the teachings of Plato over the centuries, and, borrowing from the Moslems, promulgating the teachings of Aristotle as well. The church offered a complete worldview, but now science was beginning its own enterprise.

In the following centuries the authority of organized religion in scientific matters gradually eroded. The Darwinian theory of evolution in the nineteenth century was perhaps the final blow to such authority. Many modern theologians in the mainstream defer to the authority of science in matters of historical fact and the physical world. They have developed scriptural interpretations that recognize the metaphoric and poetic nature of much biblical language. In these interpretations, the creative activity of the divine works through the physical laws of nature rather than contravening them with supernatural powers.

The historic separation of religion and science has had the unfortunate result that now science and technology are generally pursued without moral guidance and traditional religion in the West has become to some extent irrelevant. Process philosophy and the theology derived from it offer assistance in reconciling these important human activities.

The new perspectives offered by science, particularly in the nineteenth and twentieth centuries, influenced many thinkers. Among them was Alfred North Whitehead, who developed a metaphysics in the 1920s and 1930s now termed *process philosophy*. His ideas were fully inclusive and presented as a speculative philosophy and as a descriptive metaphysics. He was aware of the fact that this philosophy would itself be part of an ongoing process and would be evolving. Subsequently, three generations of philosophers and theologians have elaborated a variety of ideas and clarifications in both Christian and non-Christian frameworks based on his seminal work.

Metaphysics ("beyond physics") is concerned with the analysis of experience in the broadest and most fundamental sense. This includes not only our direct experience, but also our interpretation of it: What does it all mean? Does the universe have a purpose? We can only speculate on the answers, and our knowledge is surely superficial and incomplete. Whitehead argues that metaphysics and philosophy permit humanity to cultivate its deeper intuitions: "such as it is, metaphysical understanding guides imagination and justifies purpose. Apart from metaphysical speculation, there can be no civilization."¹

According to the process theologian David Ray Griffin, in our present day the integration of science and religion is important not only for the vision of harmony it presents, but even more importantly the lack of such integration may imperil the future of civilization. He believes, with Whitehead, that process philosophy can be of service in this regard.²

Process philosophy is remarkably compatible with what we have learned about matter and about the evolution of the cosmos. It invites us to look for patterns of interdependence and connection and for the becomingness of events rather than for assemblages of objects. Its task is ambitious: to try to unify all we know about the universe in a consistent system. As we shall see, in Whitehead's formulation of process philosophy a concept of divinity is considered necessary to construct a consistent metaphysics. Thus, process thought forms a natural avenue for the integration of science and religion. With process thought we have the framework for a new myth appropriate to our age to guide our religious quest.

Whitehead introduced process philosophy into the twentieth century with two seminal books: *Science and the Modern World* and *Process and Reality*.³ These publications signaled his remarkable second career as a philosopher at Harvard University after a distinguished career in mathematics at Cambridge University, where he coauthored with Bertrand Russell the landmark publication *Principia Mathematica*; he was also a philosopher at the University of London.

In his process philosophy, Whitehead attempted to produce a metaphysics that would encompass all that was known, including the new ideas of twentieth-century physics. He greatly influenced a generation of students at Harvard, most significantly his postdoctoral student Charles Hartshorne, who became a philosophy professor at the University of Chicago. Later, a number of graduates of the University of Chicago Divinity School used the ideas of process philosophy as the foundation of their theologies.

This chapter explains the principal ideas of process philosophy. In succeeding chapters we shall see in particular how process thought illuminates and is in full accord with our experience of modern physics and cosmology—from the quantum world of elementary particles, to the human scale, and finally to our understanding of the cosmos and its creation.

Principal Ideas

The main ideas of process philosophy are as follows:

- Events, understood as actual occasions, are primary, not substances.
- Each event is connected to earlier events.

- Its goals are to maximize creativity and intensity of experience, considered broadly.
- Events have an active selection among alternatives.
- Body and mind are interconnected.

Let's now consider each of these ideas in turn.

Events, Understood as Actual Occasions, are Primary, not Substances

Activity and transition are more important in process philosophy than permanence and substance—which is indeed in accord with our most recent scientific ideas about the nature of matter. As we shall see in later chapters, substances that appear to our senses to be solid can be regarded on another level to consist mostly of empty space filled with a continual exchange of virtual particles (photons and gluons) dancing among point masses (electrons and quarks). Thus, from the scientific perspective, permanence and substance are not what they seem to our human senses.⁴ In this modern picture, substance is much better described as a series of events.

Process thought views events, not substance, as primary. According to Whitehead, “The simple notion of an enduring substance sustaining enduring qualities expresses a useful abstract for many purposes of life. But whenever we try to use it as a fundamental statement of the nature of things it proves itself mistaken.”⁵ The idea of inert matter as considered throughout the seventeenth to nineteenth centuries, which is still a pervasive idea, gives us no possible basis for explaining interrelationships—especially those relations conceived in physics as “forces.”

Fundamental to process philosophy are *events*, understood as *actual occasions*. In the process view, the fully actual entities are not things that endure throughout time, but momentary events. Actual entities are, thereby, called actual occasions. Such events take place during a short time interval, a fraction of a second, at a particular place. Thus, actual occasions occur in space and time, space-time. We shall discuss space-time in more detail in the next chapter.

Actual occasions occur at different levels, such as at the level of atoms and at the level of human experience. An enduring entity composed of actual occasions could be an atom or an organism, such as a human being. At the most elementary level, electrons and quarks can be understood as a series of actual occasions. For

Whitehead, a moving electron has a different identity at every instant because its position has changed. Its trajectory is a series of events. Whitehead calls this a serially ordered *society of actual occasions*. A human being is a very complex society of events, the dominant member of which can enjoy emergent, unitary consciousness. A human being in process terms is described as a *complex spatiotemporal society of events*.

A distinctive feature of this view is that every actual occasion is to be understood as an *occasion of experience*. We humans certainly have "occasions of experience" and it is reasonable to assume that other animals have them as well. The extension of the idea of experience to lower levels of organization is supported, for example, by research on bacteria, showing that they have a primitive form of memory.⁶ Process philosophy assumes that at least some rudimentary form of experience is universal, existing in all actual entities. In this book we shall see evidence for this in the physical world.

The universality of experience has been termed *panexperientialism* by David Ray Griffin. In a recent book, *Religion and Scientific Naturalism: Overcoming the Conflicts*, Griffin says, in opposition to dualism:

Panexperientialism is based upon the . . . assumption that we can and should think about the units comprising the physical world by analogy with our own experience, which we know from within. The supposition, in other words, is that the *apparent* difference in kind between our experience, or our "mind," and the entities comprising our bodies is an illusion, resulting from the fact that we know them in two different ways: we know our minds from within, by identity, whereas in sensory perception of our bodies we know them from without. Once we realize this, there is no reason to assume them really to be different be in kind.⁷

The viewpoint that events and their relationships are primary is much more in accord with modern physics than with the idea of inert matter. Ivor Leclerc, a philosopher, makes this point in *The Philosophy of Nature*:

[I]n Whitehead's theory, by reason of the acting being a relating, the whole determines the constituents, and the constituents, by their acting determine the whole. In this

theory, therefore, the character of the whole “arises from” or “emerges” from the constituents, and by virtue of the inter-relatedness of their acting this character is not a mere sum of the characters of the constituents. Further, it is by virtue of this character’s being mutually shared by the constituents in their acting that the particular character, and the character of the whole, is maintained. It is this which constitutes the “bond” between the constituents, the “force” which holds them together in that particular whole.”⁸

We shall see in chapter 4 that in the hydrogen atom the electron probability distribution assumes a particular form that is characteristic of the electron in this environment, and in turn that this distribution forms a bond holding the electron to the atomic nucleus. Again in chapter 5 we shall see that particular quarks are needed to make a proton. These quark constituents are in special interconnections via gluons to bind themselves together to form a proton, the whole.

We experience the weather, other people, and ourselves, which shows that our experiences are not self-contained substances, but processes involving relationships. For Descartes, and for many later philosophers, substances and their qualities were fundamental. Relationships were secondary and even difficult to include in the philosophical systems. This notion of *substantiality* illustrates what Whitehead termed *the fallacy of misplaced concreteness*.

The philosophical idea of substantiality, which has no place for relationships, helped to separate religion from science. Without relatedness to religious questions, science became amoral. It also separated knowledge from emotion and fact from value, for there is little room for emotion and feeling in a world of disconnected objects. It also has led to excessive individualism at the expense of community with profound effects on economics and ecology. We shall consider these effects briefly in chapter 9.

Interdependence and relationships are also fundamental to Buddhist thought. They are examples of several areas of compatibility of Buddhism and process philosophy. The Buddhist doctrine of *pratitya-samutpada*, which means “dependent origination” or “conditioned genesis,” asserts that all things *are* by their participation in other things. For the doctrine of conditioned genesis nothing in the world is absolute. Everything is conditioned, relative, and interdependent. This is sometimes called the Buddhist theory of relativity.⁹

In common with process philosophy, Buddhists reject the idea of

substantiality (*anicca*). Buddhist meditation practice is not a quest for being, a substance that grounds all things, but a search for emptiness, or perfect peace. Buddhists also reject the idea of a permanent self (*anatta*) since all things are changing, including ourselves. Change is fundamental to process thought.

Each Event is Connected to Earlier Events

Reality is a dynamic organism rather than a machine. Each level of organization—atoms, cells, organs, organisms, and communities—affects all the other levels in a complex *web of interactions* or *connections*. This is Whitehead's "principle of relativity," which has some similarity to the Buddhist one that was just referred to.

Each occasion of experience integrates and uses information in its own incorporation of past particles, fields, and possibilities to produce itself. Each such event Whitehead says, *prehends* the previous events. "Prehends" has an active meaning: "to grasp, or incorporate." It implies that the event is an action—gathering data from the past. This idea challenges the usual notion of cause and effect wherein the affected object is passive. Here not only the causing event but also the affected event takes an active role. *Prehension* describes the connection between past and present events, no matter how elementary. The present event, which is partially self-determining, makes a creative selection among data from all past events and from alternative future possibilities, goals, or aims. Such aims are only potentialities until the selection actualizes them.

When we make a decision at the human level, we incorporate, directly or indirectly, all past experiences, for example, suppose I consider going to a trade school or graduate school. I take into account my past experience, teachers, and what I have studied. Goals are important, too: What is important to me as my life's work? Should I attend now or wait? I also consider all the possible schools. Finally I make a decision to go to a particular school and study a particular subject. I have taken all of this into account, albeit often unconsciously, in making a choice. Once I make the decision, it becomes a fact (objectified) on which I shall base future decisions, such as when I will leave and where I will live. When we have made a decision, this event is actualized and becomes an object that is available for the experience of future entities.

Each occasion gathers information from all previous occasions. At some level we are aware of the mysterious "otherness" of our fellow creatures and take them into ourselves, informing our own actu-

ality—not just in appreciation, but rather in recognizing that the “other” is in some sense constitutes ourselves. We are all inextricably linked in the matrix of creation. We cannot be separate.

As the biologist Conrad H. Waddington observed: “Every event, for Whitehead, contains some reference to every other event in the universe. Every time-extended occurrence to which we give a name, every stone, or table, or person is, as it were, a knot in an indefinitely complex four-dimensional network of relations.”¹⁰ Thus, in the process view, everything is interconnected through relationships. In this philosophy there is a place not only to include scientific truth, but also for human perception of spiritual reality.

Interconnectedness, for example, has long been a precept of Native American thought. Jack Forbes, a professor of Native American Studies, expresses its philosophy in his poem “Kinship Is the Basic Principle of Philosophy,” the first few lines of which are as follows:

The Thunder-beings are alive:
 grandfathers!
 The Earth is alive:
 mother and grandmother!
 The trees are alive:
 grandfathers, grandmothers!
 The rocks are alive:
 relations of all!
 The birds of the air
 the fishes of the sea
 the animals that run
 the smallest bugs
 we are related!

For hundreds of years
 certainly for thousands
 Our Native elders
 have taught us
 “All My Relations”
 means all living things
 and the entire Universe
 “All Our Relations”
 they have said
 time and time again.

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In the process view, reality is a myriad of serial events somewhat like a motion-picture film, in which the action proceeds from one frame to another in a fraction of a second. One difference in process thought is that each frame is itself a process in which there is a pause for the integration of past events and goals. It would be more in conformity to Whitehead's thinking to view each "frame," or occasion, as actively incorporating, "prehending," all the preceding frames, not only of the movie to which it belongs, but also of all the other movies. In any case, at the moment of decision novelty may be created—there may be something new in the universe.

Therefore, according to process philosophy, the world is a web of interrelated events, a network of mutual influences. The world acts as an interpenetrating field that extends throughout all space, in contrast to the idea of localized self-contained particles. We shall meet this idea of interconnection in quantum mechanics, in particle physics, in complex systems, and in the formation of the universe.

There are times when we can feel intuitively such fundamental interconnection. For me such a moment occurred while backpacking in the Trinity Alps of California. We were camping at an alpine lake with granite cliffs soaring a thousand feet above us. All was quiet except for the brush of a slight breeze in the pines and firs. I experienced an overwhelming feeling of being connected intimately with everything around me. The ferns, the trees, even the rocks, seemed to be part of me. We were all one. A great feeling of contentment came over me. It seemed sublime and natural.

The message was: This is just the way it is. Such spiritual experience is not in the logical methodology of science, yet it was very real to me. Process philosophy acknowledges not just our rational knowledge of the world, but gives feeling and intuition a prominent place as well. Those of the Quaker persuasion might say that such experiences may come when one has a "prepared mind." Mine was prepared in the sense that I had placed myself in a place of pristine beauty removed from the frantic pace of our modern life.

*Its Goals are to Maximize Creativity and Intensity of Experience,
Considered Broadly*

My backpacking experience might be described in more philosophical language: A society of occasions (me) has a certain *intensity of experience*, or *satisfaction*. Every occasion, and every serial-

ordered society of occasions, has an intrinsic value, an inner reality for itself. For Whitehead's organic philosophy this experience is "the self-enjoyment of being one among many, and being one arising out of the composition of many."¹²

Since occasions of experience are *acting* entities that incorporate their own past experiences and those of other occasions, new wholes can *emerge* as each occasion manifests its relation to the others. This mutual interrelating may produce a defining characteristic of a new whole and in turn the acting entities are themselves constituted in relation to the whole. This is not possible if the occasions of experience, or events, are changeless and noninteracting, which is the view taken when substances are assumed to be the basic entities.

Cells, for example, may unite to form an organ, such as a human heart. As a result they constitute themselves, emerge, into a new whole. The heart has capabilities that the individual cells did not have. It has unique defining characteristics, and the new organism has an enhanced intensity of experience.

Events Have an Active Selection among Alternatives

Whitehead assumed that *mentality*, at least in some slight degree, is present in every occasion of experience or event. Here "mentality" is not used in the usual sense as only an attribute of humanity. Although human beings are unique by virtue of our very high-level form of mentality, Whitehead regarded a primitive form of mentality to be universal—a bold assertion of his world vision. This is an example of his search for consistency in his metaphysics. He assumes that there is an elementary mentality in every actual occasion that permits it to make an active selection among alternatives.

Figure 1.1 shows schematically the formation of an event, in the sense of an occasion of experience. The event begins with a prehension, a grasping, of previous events, including the prior events of the enduring society to which it belongs, by the physical pole. The physical pole is the part of the event that interacts with the external world. This information passes onto the mental pole. The mental pole is internal to the event. It synthesizes the data coming to the physical pole with the goals of this becoming event. This process is termed a *concrescence*. When the synthesis is accomplished, all the data are simplified in a *satisfaction*, in Whitehead's terminology.

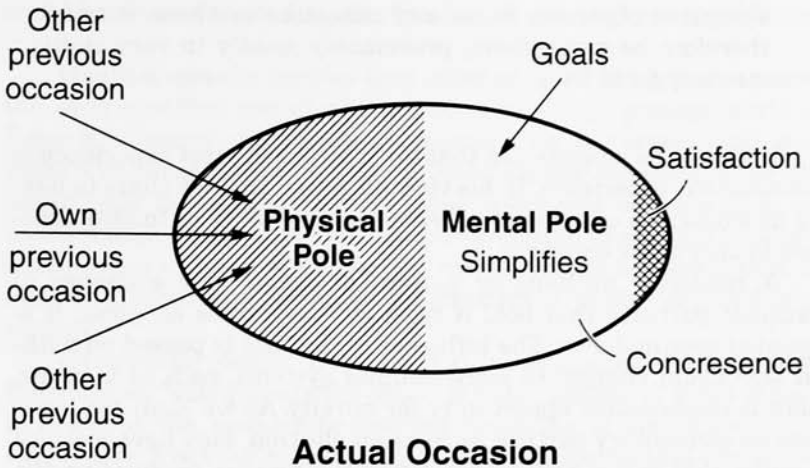


Fig. 1.1. Schematic diagram of an occasion of experience, or actual occasion

The mental pole's creative simplification by selection among alternatives may lead to increased intensity of experience and to novelty. It may lead to a new whole (synthesis) through emergence with other events. On the other hand, a single electron's experience may be viewed as being so dominated by its physical pole that upon concrecence its characteristics are repeated over and over. It becomes an *enduring individual* that retains the same character over a long period of time.

After its satisfaction, an event is said to be *objectively immortal*, as it becomes a datum to be prehended by future events. Note that the event takes place in a finite time, which flows from the past to the future.

Waddington expresses the generalized concept of mentality, which is assumed to be involved in all processes:

Whitehead was bold enough to take on, face to face, the most difficult of intellectual problems—the fact that each one of us has a conscious experience, whereas in science we try to account for the behavior of things by means of concepts or entities—atoms, waves, fundamental particles, and so on—whose definition does not contain any reference to consciousness. Whitehead argued that this is not good enough: you have either got to have consciousness, or at least something of that general kind, everywhere; or nowhere; and

since it is obviously in us, and cannot be nowhere, it must therefore be everywhere, presumably mostly in very rudimentary form.¹³

It should be emphasized that for Whitehead most experience is nonconscious experience. In his view all actual entities share in having nonconscious experience, whereas experience rises to consciousness in only a few occasions.

A relatively unchanging pattern of events (the exchange of transient particles that hold it together) dominates an atom. It is repeated over and over. The influence of the past is passed on without significant change. In more complex systems, such as humans, there is considerable opportunity for novelty. As we shall see later, even an elementary particle, such as an electron, may have a choice of paths that is *not predictable*. From the process perspective the electron is making an active choice among possible alternatives. It has an *openness* available to it.

Body and Mind are Interconnected

Process philosophy rejects not only mind-body dualism, but also materialism or idealism. Materialism, while reducing mind to matter, asks us to take our own experience—what we know best in the universe—as secondary. Idealism would have us reduce matter to mind, thereby implying that our own bodies are less than fully real. Dualism permits both mind and matter to exist, but it has little to say about how they interact.

Dualism became ensconced at the center of European thought with René Descartes in the seventeenth century. His philosophy was mechanistic: "Give me matter in motion, and I will construct a universe." One exception did not fit his mechanical model: human thought. A human being was an exquisite machine—but it had a mind attached that must be taken into account. Thus was born the Cartesian doctrine of the dualism of mind and matter.

In process philosophy the reciprocal relation between mind and body is fully natural. In Charles Hartshorne's words: "Cells can influence our human experiences because they have feelings that we can feel. To deal with the influences of human experiences upon cells, one turns this around. We have feelings that *cells* can feel."¹⁴ When we are angry or joyful there are measurable biochemical reactions at the cellular level. In process terminology we

could have said that our cells "prehend" our angry or joyful feelings.

Dualism usually implies that mind or spirit is superior to matter—a stance that can discourage concern for the present world in favor of a future one. Process philosophy, on the other hand, provides a unifying picture. It views human beings, for example, as different only in complexity from other organisms, or even from so-called inanimate objects—and we are connected to all. This makes it much easier to identify with nature rather than to feel apart from it. Process philosophy, therefore, emphasizes a profoundly inclusive ecology.

Hartshorne makes the point that in separating the body from the mind we "subordinate the concrete to the abstract." What is real, however, is the moment-to-moment becoming of our occasions of experience. Even our personhood or self is an abstraction—in agreement with Buddhist thought, which maintains that the idea of a substantial self is an illusion because we are changing from moment to moment.

Summary

In summary, I gather here the principal ideas of process philosophy:

- *Events*, understood as *actual occasions*, are primary, rather than substances. This gives the world a dynamic quality and promotes relationships. It unites mind and body as an interconnected unity and provides a moral perspective for science.
- An event actively grasps, or *prehends*, all previous events from the universe in varying degrees in its *physical pole*.
- Each event is assumed to have at least an elementary *mentality* that it uses to make a selection among alternatives, taking into account its goals for the future and data from the external world. This process of self-determination is termed a *concrecence* (becoming concrete).
- When the event completes its process of concrecence, it reaches *satisfaction*. After its satisfaction the event becomes *objectively immortal*, being available as a datum for future events.

- Goals are to maximize creativity and intensity of experience, considered broadly.
- A web of prehensions *interconnects* the world. New wholes *emerge* as events interrelate. Mind and body, being composed of the same kinds of entities—occasions of experience—interrelate.
- *The future is unpredictable* for any event because of the alternatives available to it, its *openness*. This is the basis for the *emergence of novelty and creativity*.