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Participation, organization and mind: toward a participatory worldview

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PARTICIPATION, ORGANIZATION, and MIND: TOWARD A PARTICIPATORY WORLDVIEW

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<u>Thesis Summary</u>:

The present modern worldview, the Mechanistic Worldview, has become inadequate to handle pressing concerns of society. It has outlived its usefulness, and hence a new worldview is called for. I develop the Participatory Worldview as a promising alternative, and explore various themes of participatory philosophy throughout the history of Western Civilization.

As I conceive it, the concept of 'participation' is fundamentally a mental phenomenon, and therefore a key aspect of the Participatory Worldview is the idea of 'participatory mind'. In the Mechanistic Worldview mind is a mysterious entity, attributed only to humans and perhaps higher mammals. In the Participatory Worldview mind is a naturalistic, holistic, and universal phenomenon. Human mind is then seen as a particular manifestation of this universal nature. Philosophical systems in which mind is present in all things are considered versions of *panpsychism*, and hence I argue for a system that I call 'participatory panpsychism'. My particular articulation of participatory panpsychism is based on ideas from chaos theory and nonlinear dynamics, and is called 'hylonoism'.

In support of my theory I draw from an extensive historical analysis, both philosophical and scientific. I explore the notion of participation in its historical context, from its beginnings in Platonic philosophy through modern-day usages. I also show that panpsychism has deep intellectual roots, and I demonstrate that many notable philosophers and scientists either endorsed or were sympathetic to it. Significantly, these panpsychist views often coexist and correspond quite closely to various aspects of participatory philosophy.

Human society is viewed as an important instance of a dynamic physical system exhibiting properties of mind. These properties, based on the idea of participatory exchange of matter and energy, are argued to be universal properties of physical systems. They provide an articulation of the universal presence of participatory mind. Therefore I conclude that participation is the central ontological fact, and may be seen as the core of a new conception of nature and reality.

Participation, Organization, and Mind: Toward a Participatory Worldview

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Chapter 1 – The Nature of the Participatory Worldview

1) The Participatory Worldview and the Spiral of Western Civilization

As we find ourselves at the beginning of the third Millennium, Western civilization faces an epochal change. This change is far more profound than the mere numerical advance of the calendar. Our secular, dualistic, reductionist view of the world -- our Mechanistic Worldview, also known as the Newtonian or Cartesian worldview -- is showing signs of old age. After 400 years of guiding our inquiry and actions, after many successes and a growing number of failures, the Mechanistic Worldview is increasingly under attack on many fronts: philosophically, ethically, spiritually, even from within itself, from the scientific and technological perspective. Our intellectual and social lives have become vastly more complicated than in past generations. Social and environmental problems are rapidly mounting, and depression and apathy seem increasingly prevalent. Unfortunately, the Mechanistic Worldview -- the source of our values, the justification for our actions, the framework upon which all our ideas are laid out -- seems less and less able to cope, and less able to provide satisfactory resolution. The time has come to deeply reexamine our present worldview, and, to the greatest degree possible, to creatively transcend it.

Even though the Zeitgeist affects us all, the task of articulating a new worldview falls primarily to those philosophically-inclined thinkers of all disciplines[1]. Traditionally the greatest burden for this task has fallen upon the philosophers proper. Philosophers are, after all, in the business of examining things deeply, of understanding the root causes of our intellectual and emotional deficiencies, and of charting new paths for society. Such has been the role of the great philosophers throughout history. Unfortunately contemporary philosophy seems, at this pivotal moment in history, unable to rise to the challenge. The complexity, obscurity, and irrelevance of much of modern analytic and linguistic philosophy are a powerful indictment. Modern philosophy has slipped, perhaps unwittingly, into the role of defender of the Mechanistic Worldview. In doing so it has created strong inhibitions against deep criticism of mechanism and the need for fundamental change. Perhaps I am overstating the culpability of modern philosophy;

after all, every culture must evolve guardians of the status quo. This is how a culture defines and preserves itself. Nonetheless, new worldviews will inevitably emerge, as they must, for this is in the nature of the evolution of society. And in true Kuhnian fashion, the greatest likelihood is that new worldviews will emerge from *outside the system* of conventional philosophic thought.

A number of people and organizations are responding to this vital challenge of our age. Emerging worldviews come in many variations, whether ecological, spiritual, social, or technological. Many of these, it must be agreed, are utterly incapable of responding deeply to the needs of society and the planet. One in particular, however, seems most promising; one that has been called the *Participatory Worldview*. It is this worldview that I shall articulate and examine in this dissertation.

In a word, the Participatory Worldview is a response to the increasingly apparent limitations of the Mechanistic Worldview: Where the Mechanistic Worldview emphasizes reductionism, the Participatory Worldview emphasizes holism. Where the Mechanistic Worldview adopts a dualistic, subject-object approach to reality, the Participatory Worldview adopts an interactive, cooperative approach. Where the Mechanistic Worldview focuses on quantitative analysis, the Participatory Worldview focuses on qualitative analysis. Where the Mechanistic Worldview is ethically neutral and detached, the Participatory Worldview incorporates a strong axiological component. Where the Mechanistic Worldview investigates the world via the scientific method, the Participatory Worldview uses new methodologies of participation and action research. Where the Mechanistic Worldview sees a universe of dead inert matter, the Participatory Worldview sees a universe active, animated, and co-creative.

Let me begin by placing the Participatory Worldview in its larger historical context. I will do this via a guiding metaphor, as follows: In the 2500 years since ancient Greece, Western civilization has embarked on a monumental detour of thought. The aboriginal worldview was of a spiritual, animistic, integrated cosmos. We see this in the remnants of ancient cultures throughout the world. We see this in the great stories of Homer and Hesiod, in the Vedas, in the Bhagavad Gita, in the pantheon of Greek and Roman gods, in the myths of the Australian aborigines. Humanity was embedded in a spiritual and divine world. Humanity's role in the cosmic system became articulated in the various myths, religions, and cultures. Such was the state of humanity for many thousands of years. It is this holistic, animated worldview (actually, collection of worldviews) that, historically, represents the 'main path' of human cultural evolution.

But that prehistoric worldview was of a dim, unarticulated, incoherent cosmos. Knowledge was in some sense superficial, limited, and immature. The natural world was mysterious, arbitrary, and in many ways inscrutable. The gods of nature assumed human form, and became attributed with human-like qualities -- happiness, anger, vengeance, pride, lust.

In the overall evolution of total human culture, such an unarticulated worldview could not persist. The nature of evolution is transcendence, and thus this primitive outlook on mankind and nature was impelled to change. The path of transcendence required a new perspective on the cosmos. As it happened, this new perspective was the one offered by what we broadly call the Western worldview[2]. Western civilization embarked on a long detour from the main path of thinking about the world, a detour that allowed for a new and transcendent perspective on itself and the universe.

The groundwork for this detour was laid by the pre-Socratic Greek philosophers, but it began in earnest with Plato and Aristotle (circa 400 BCE). Plato's articulation of the essence of Western philosophy and Aristotle's development of abstract, analytic thinking launched an entire civilization on a path of new ideas, conceptions, and methods – including logical and mathematical analysis, scientific method, and technological innovation.

This detour was essential, and in some sense inevitable. In order to better understand and articulate our cosmos, it appears to have been necessary to pass through a phase of dualistic, analytic inquiry. Only by this means could we have arrived at a knowledge of evolution, of the history of the Earth and universe, and of the nature of physical reality. Humans are a product of universal evolution, and we possess unique capabilities for reflection and articulation. As the medieval Scholastics taught, we are a microcosm that is a reflection of the macrocosm. In other words, this grand detour of the mind allowed the universe, in the form of the human, greater articulation and knowledge *of itself.* In at least this one dimension, the cosmos 'knows itself' more deeply than ever, through us. Thus this detour served the larger interests of the universe; it was a necessary and fitting part of the greater process of evolution.

And yet now the detour appears to be ending. We can envision a return to the main line of cultural evolution, of worldviews that are holistic, spiritual, animated, and co-creative[3]. But we return not on the same level as before, but rather at a much greater height. In this sense, *the path of Western civilization can be seen as a spiral.* We have deviated from the great (and largely unwritten) history of mankind, passed through a tremendous epicycle of learning, and now return – hopefully wiser and chastened – to continue our larger cultural destiny. Our return to, and transcendence of, this mainstream of cultural evolution is articulated in the Participatory Worldview.

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I offer two general categories of evidence for this view. First, there are persistent traces of the older, deeper worldview all throughout the history of Western philosophy. These occur primarily in the various forms of *panpsychism* that can be found in the thinking of many of our most important intellectuals – panpsychism being defined, roughly, as the doctrine that all things have a mind-like quality. These traces are largely unknown, unexplored, or outright ignored by modern philosophers. And with good reason: they strongly hint at the ultimate undermining of the Mechanistic Worldview. To fully spell out and document these traces of panpsychism requires book-length treatment, and here I can only give (in Part II) an overview of the most relevant points.

One also finds traces of *participatory* thinking throughout Western philosophy, and significantly, these tend to occur in conjunction with the elements of panpsychism. I will show that the panpsychist philosophers frequently contributed to advances in the participatory philosophy, either via theories of being (ontology), of knowledge (epistemology), or in methodology. I find this correlation highly suggestive; it indicates that panpsychism has some deep connection with a Participatory Worldview. As these participatory and panpsychist elements tend to occur together, I will treat them jointly in Part II.

The second general category is this: Even from within the Mechanistic Worldview -- from quantum mechanics, from aspects of modern biology, and from the study of nonlinear systems and information theory -- we find evidence of a return to an animated, co-creative cosmos. This is manifest in the *scientific concept of participation* as developed by Wheeler, Bateson, and Bohm, and in certain aspects of chaos theory, as I will explain in detail.

Consequently, my main task will be to illuminate and unify these two general bodies of evidence. In the process I will bring into the discussion a third central theme, my own theory of mind and reality. This theory – which I call *hylonoism* – is offered as an element of a fuller and more articulated picture of the world. I see hylonoism as contributing to a fusion of the aboriginal intuition of a panpsychic reality with the insights gained by our 2500 year detour of thought. In essence, I will be arguing for a *panpsychic interpretation of participatory philosophy.*

Following Skolimowski (see his 1994, pp. 120ff), I see the spiral of Western civilization as historically encompassing four general phases: The earliest, pre-historical phase, with its holistic and animated cosmos, is designated "Mythos". The era from ancient Greece through the early Christian era is called "Logos". The rise and dominance of the theological worldview is referred to as "Theos". And the period of the Mechanistic Worldview is labeled "Mechanos". As I have explained, I believe that we are now rejoining the ancient axis at a greater 'height', in a new phase that we may call "*Participatory Panpsychism*". These phases are shown in Figure 1.

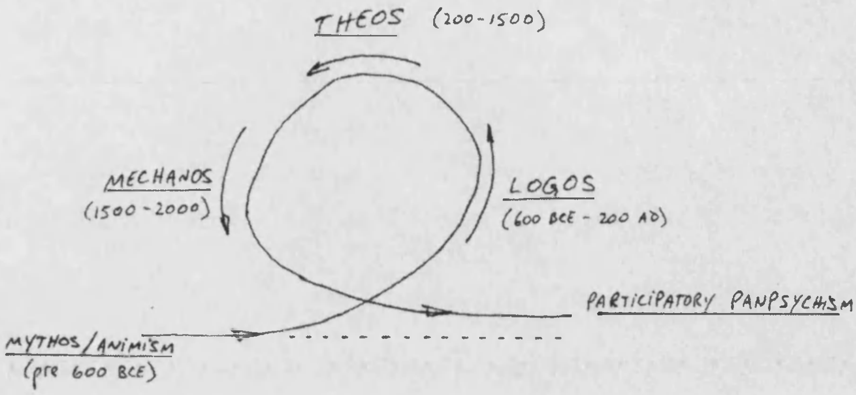

Figure 1 – Five Phases of Western Civilization

Let me emphasize here that neither participatory philosophy nor the Participatory Worldview require a panpsychist orientation. Participation can be well articulated without recourse to panpsychism; in fact, neither Wheeler nor Skolimowski – two central figures in the recent development of participatory philosophy – are explicitly panpsychist. On the other hand, Bohm, Bateson, Abram, and Berman all have recently put forth elements of panpsychism in their philosophical systems, and all have clearly articulated aspects of participatory thinking. And there are the many intriguing historical connections between participatory ideas and panpsychism. Here I will offer a panpsychist interpretation of participation, both because I see it as representing the more ancient undercurrent of human culture, and because it is a logical outcome of hylonoism and my reading of chaos theory.

2) Setting the Framework

Let me begin with a few very general observations that will serve to frame the subsequent discussion. I offer the following vision: all organization, all structure, bears a common imprint. This imprint is something that is dynamic, interactive, and participatory. It results from the continuous exchange of material and energy amongst the elements of the organization, and between different levels of organization[4]. It is present in all structured matter, from atoms to rocks to people to ecosystems to stars. It is an inevitable consequence of the physical reality. This core characteristic of reality is manifest in humans as 'mind', and in other things as something analogous.

I will attempt to describe and articulate this common link among all levels of structure. This is not to propose that all structures are the same, or are equal, or are one, but rather that all can be described with common concepts and can be said to share at least some common fundamental characteristics. An analogy can be drawn with the role of DNA in living organisms. DNA is a common means by which all organisms grow, reproduce, and pass along their genetic inheritance. No two organisms have the same DNA, but each one's structure is the same, and is composed of the same basic elements. The action of DNA influences much, but certainly not all, of how the organism behaves in the world. And as a philosophical concept, DNA is vitally important because it demonstrates a common linkage, a common heritage, amongst all living creatures. It unites humans with the world of animals and plants in a way that has a fundamental effect on how we view ourselves and our place in the natural world.

So too, I propose, can we conceive of a common means of describing organized structures. Such a means is clearly more general than DNA because it encompasses not just living organisms, but everything from inanimate structures though collections of structures and organisms. My theory of hylonoism offers up a new way of viewing ourselves and of viewing the world, and has important implications for many aspects of existence. In a nutshell, hylonoism claims that material reality is deeply infused with mind. Such a theory is antithetical to the Mechanistic Worldview, and, I claim, is thus part of a truly new worldview. The concept of hylonoism, based as it is in the dynamic exchange of energy, is a fundamentally interactive picture of the world. It is a picture in which elements of structures interact in a particular way, in which they *participate*, to create organized wholes, and in which organizations interact to create new, higher-order structures. Hylonoism is an attempt to provide the theoretical and philosophical basis for the emerging Participatory Worldview.

Such an endeavor is necessarily wide-ranging and interdisciplinary. It encompasses philosophy of mind, physics, complexity theory, and systems theory, among others.

Although my main approach will be philosophical in nature, I also draw on scientific, mathematical, and historical sources to help articulate the relevant concepts. I present only the degree of detail necessary to make the point. Needless to say, the Participatory Worldview is a dynamic, emerging concept, and no account of it can be considered final and complete. What I hope to achieve is the creation of a comprehensive framework for this worldview, which will allow us to better understand its development throughout history, and to begin to articulate some of its more important aspects.

My goal is to interpret and articulate the participatory worldview as fully as possible starting from the commonly held assumptions about science, mind, and the nature of reality. It is my belief that there is plenty of room for expansion and articulation in our worldviews from within the present set of conceptual tools. The same set of facts about the world can give rise to many interpretations, and new interpretations, or new paradigms, can change the way we see the facts. I will take the facts of the physical world and reinterpret them in a new light. This new paradigm will lie outside the standard objectivist, materialist paradigm. Anything else would be less than a truly new worldview, a rather minor modification of what presently exists.

There are different levels of assumptions that must be clarified. When discussing fundamental issues of mind, consciousness, and reality, one must make clear both one's epistemological and ontological assumptions. In regards to the first, the traditional split is between *rationalist* (inquiry using the powers of intellect and reason) and *empiricist* (inquiry via experimentation and sensory data) approaches to acquiring knowledge[5]. I will follow primarily a rationalist approach, although I will occasionally make arguments based on empirical data and on sensory impressions, particularly when discussing phenomenological concepts.

With regard to ontology, one must be especially clear. The nature and substance of reality that one accepts, or starts from, can clearly affect the whole nature of the discourse. Discussions on the nature of mind in particular are notoriously sensitive to ontological assumptions. It will be helpful, if only for historical comparison reasons, to situate arguments with respect to certain traditional 'branch-points' of ontology, such as monism vs. dualism, or naturalism vs. supernaturalism. For example, we may define the conventional scientific ontology as *materialistic monism, or physicalism* – nothing exists in the world except for various forms of matter, or mass, and the fundamental forces of physics that arise from, and act on, them[6].

I will begin my discussion within this standard physicalist paradigm. As I explore aspects of my hylonoetic theory, it will point toward the view that materialistic monism is inadequate to describe all aspects of reality. However, the deep integration and connection of all things ultimately requires, I believe, *some* form of ontological monism. This underlying monism manifests itself in different ways, of which two seem relatively clear (at least since Spinoza): a 'physical' realm, and a 'mental' realm. The second realm that I argue for is in itself non-material, but arises *in conjunction with* the material aspect of the cosmos. Unlike the Platonic realm of the Forms, it does not exist objectively and unchanging independent from physical reality.

Beyond these two, there may well be one or more other dimensions to reality, as I will explain. However, I deal for the most part only with these two basic aspects of an underlying monistic reality. In other words, I argue that a form of *naturalistic, dual-aspect monism* is the most useful (though not necessarily most complete) way to describe the world as we experience it. Thus, I will attempt to transcend both physicalism and conventional dualism, but without relying on esoteric or supernatural concepts. I seek an entirely naturalistic description of reality, a reality that is ultimately holistic, participatory, and deeply interconnected.

It may be an advantage to begin my arguments from within conventional physicalism, and proceed (at least initially) under conditions of conventional rationalism. It is clearly the more conservative approach, in that my conclusions will be found not to rely upon newly-created or highly-contentious concepts. My assumptions and method of analysis are largely conventional. It is my interpretation and conclusions that are unique.

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So to summarize my general approach in this thesis: My primary intention is to make an investigation into the phenomenon called 'participation'. I want to explore its deeper meaning, its implications and its relevance at the present point in the evolution of Western civilization. As mentioned, I think that participation and participatory philosophy can form the basis of an alternative worldview, one that may help resolve some of the more troubling aspects of our present outlook on society and nature.

To this end, I will weave together *three main themes*: First there is the concept of *participation* itself, as it has evolved over the past 2,500 years. Second is *panpsychism* -- from its early manifestation in ancient Greece through the well-articulated philosophical views of the 20th century. Third, I will develop my own theory of hylonoism as an attempt to illuminate and unite the other two strands, and to further articulate the idea of participatory mind. I will demonstrate that hylonoism has a number of important historical predecessors, and is both a continuation and an advancement of many great insights and intuitions about mind.

The process of weaving these threads together is not a simple linear one. It requires a number of loops and iterations, a series of investigations and examinations that may hit upon similar themes a number of times, but from different angles and perspectives. I seek to build up an all-around picture of the Participatory Worldview, and this requires that I set the background, lay out the structure, and then proceed to add the details that give it life -- all with an eye on the relevancy of historical ideas, and placement in the evolution of thought. Thus, the trajectory of this thesis may perhaps be described as a kind of spiral in itself, a circling around of related ideas, each time progressing a bit higher toward an articulated worldview.

Finally, let me note that my process of thinking here has been in itself an attempt at participatory inquiry. Rather than moving toward a preconceived end, I have attempted to follow the looping and weaving of the three main ideas in a somewhat open-ended manner. My research was done in an open and cooperative fashion, with only general objectives to guide me. As such, this thesis reflects the nature of the participatory world itself: it is open, interactive, sympathetic, directed but not restricted -- and never truly complete. If this thesis fails to present any hard definitions or ultimate truths, it is because these things are not in the nature of the participatory world.

Participatory thinking requires a delicate balance. One must allow concepts to be open to their contextual surroundings, and yet still make them as articulate and illuminating as possible. We must communicate with words, and yet recognize that verbal definitions are inherently problematic. From a participatory perspective definitions are fundamentally context-dependent; they are incapable of being usefully stated or appropriately understood in isolation. Definitions, like 'truths', are necessarily incomplete. We find that we have rather a series of evolving, 'participatory definitions', and 'participatory truths'. Each system of truth reflects a particular state of mind, and a particular state of the cosmos.

The theories I present here -- hylonoism in particular -- are not in any way intended as absolute truths. Nor are they complete and finished products. They are rather *open philosophical conjectures*: *if* we look at the world in the way that I suggest, *then* here are the consequences and implications. They will be fruitful conjectures if they provide greater understanding and illumination of the central issues of existence. My ideas here are intended only as a further step in the articulation of the human condition, and our relationship with the world.

Let me now map out more specifically the approach I take. This thesis is structured in three parts:

Part I introduces the concept of participation, and explores its relation to recent developments in chaos theory. Chapter 1, The Nature of the Participatory Worldview, describes the basic concepts of the discussion, and looks at the history and development of 'participation' as a philosophical concept, particularly in contrast to the modern scientific worldview. In Chapter 2, Concepts of Mass and Energy in Western

Civilization, I look at the development of the concepts of 'mass' and 'energy' since ancient Greece. This sets the stage for a broader understanding of the mass-energy universe, and its participatory nature. The third chapter, Chaos and the Complexity of the World, examines the essentials of chaos theory, with an emphasis on how it relates to physical structures of the natural world. The main principles of chaos are seen to be directly relevant to the philosophy of participation. Chapter 4, Mind and Brain in Phase Space, employs chaos theory, and more generally, nonlinear systems analysis, to articulate a new conception of the human mind as it relates to the physiology of the brain. I then use this analysis for generalization to other systems, living and non-living.

Part II explores the concept of panpsychism and its relevance to participation from a historical perspective. It is primarily an inquiry into the mental aspect of the participatory world. Chapter 5 is titled Panpsychist Perspectives from the Ancient World. Here I discuss the historical development of generalized theories of mind, particularly in light of my hylonoism theory. I trace panpsychist theories from the ancient Greeks through the Italian Renaissance period of Telesio, Bruno, and Campanella at the end of the 16th century. Chapter 6, The Modern Era of Panpsychism, continues this historical study, beginning with Spinoza and Leibniz, through the German scientist-philosophers, and up to the present.

Part III examines the scientific basis for panpsychism and participation, and extends the basic insights of hylonoism to consider larger issues of organization and evolution. It primarily investigates the physical aspect of the participatory world. Chapter 7 is on Scientific Perspectives on Participation and Mind, in which I look at arguments in support of both panpsychism and participation from within the scientific worldview, focusing on events of the past 150 years. The works of Bateson and Bohm are central here. In Chapter 8, Social Phenomenon, Aggregate Mind, and the Nature of Exchange, I consider the 'group mind' concept, and its role in a larger hylonoetic world. Processes of exchange, expenditure, and abundance are key. Technology is discussed as a key ingredient in the expropriation of energy for the human species. I then pull together several lines of thinking, and offer up some comprehensive thoughts on participation and structure.

3) The Meaning of Participation

First, I want to explore in some detail the meaning of the term 'participation', and how it can play such an essential role in the articulation of a new worldview. The word 'participation' generally has a positive, up-beat, optimistic tone; it implies that someone or something is 'playing along' with the group, is cooperating, is working with others to achieve some larger goal or objective. I find this aspect of 'cooperating with others to achieve a joint purpose' highly evocative and entirely appropriate for use as a basis of a new perspective on the world -- as will become clear later on.

It is enlightening and useful to examine the definition and etymology of 'participate'. There are three primary definitions[7]. The first is the common usage, "to take part [in]", as, to participate in a group discussion. This clearly involves *output* on the part of the participator; he or she must proactively exert themselves, speak up, take action, become involved. The second definition is "to have a part or share of something", as when we say 'the employees are now allowed to participate in the profits'. This is a passive sense of the word, and in particular is passive *reception*; I participate by receiving something, with no essential action required – though of course I (presumably) willingly allow the reception.

The third is perhaps the most subtle and least used: "to possess something of the nature of a person, thing, or quality". This is subtly dynamic; it implies capturing something of the essence of a thing, incorporating it, and even becoming in a sense *changed* by it. By this meaning, participation is a state *not merely of being, but also of becoming*. This meaning derives from the origins of the word 'participate'. To participate is to 'partake', literally, 'to take a part of'. Participate comes from the Latin noun *particeps* ('partaker'), which is a combination of *part* or *pars* (a 'piece') and *capere* ('to take'). *Particeps* came from a translation of the Greek word *metokhe*, of the same meaning, 'partaker'. The noun *particeps* became, in verb form, *participare*, which in English became our verb 'participate'. Thus our three standard definitions describe three different states of existence: to give, to receive, and to empathetically incorporate something of a thing's essence.

I suggest that we need to synthesize these three meanings to come up with a fully adequate definition of 'participate', one that is suitable as the basis for a new worldview. They are clearly compatible, and form a complete picture of interaction: I give something of my essence, I receive something from another, and I possess it, I incorporate it into myself. The participator takes something of the essence of that which he participates with, and makes it his own. And likewise in the reciprocal sense, he gives something of himself to the other. This view prefigures one of my central premises, that there is no such thing as one-directional participation, that all participation is bi-directional. It is a simultaneous give and take, an *exchange*. This exchange is essential to understanding the participatory nature of reality. Exchange is the process by which we are bound to others, by which we are connected with other individuals, with humanity at large, and with nature.

With this expanded notion of participation in hand, I will explore an important point: that exchange, even if of limited duration, causes the 'emergence' of something from the background noise of the universe – both a form of *being* and a form of *mind*. To the extent that this emergent being breaks into awareness, we may say that it appears as a new feature of the world. In this way we may say that *participation is creation*.

As I have already alluded to, participation and the Participatory Worldview can be seen in contrast to the Mechanistic Worldview. A central characteristic of the Mechanistic Worldview is objectivity. Consider by way of comparison the meaning of 'objective'. It has a dozen or so meanings, including "free from personal feelings or prejudice", "unbiased", "dealing with things external to the mind". Objective is a form of 'object', which comes from the Latin sources *obicere*, or *obiectum*. This in turn is derived from *ob-* ('towards') and *jacere* ('throw'), so the combined meaning is "something thrown towards one". So in its adjective form, to be 'objective' is "to throw a thing in front of someone, to place a hindrance in the way, to oppose". Thus, by this interpretation, the "objective" Mechanistic Worldview can be seen, literally, as an obstacle, as something put in front of our mind's eye, which obscures a deeper view of nature.

There is also a more benign interpretation, one that means "to put something in someone's way so that it can be seen, or made visible". Perhaps the Mechanistic Worldview began its existence with this more innocent flavor, but over the centuries it has become dominant and oppressive towards other, more sympathetic approaches to knowledge. Now, to be 'objective' is to have the strong meaning of being "free from personal feelings" and to treat all things as if they were truly "external to the mind". The premise of the Participatory Worldview is that this approach is both *inappropriate* – nothing is truly external to mind – and *damaging* – as it has now become destructive of society and the natural world.

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Participation is, of course, a fact of everyday life. We all are continuously participating in society and in the larger natural world. We participate in culture, in business, in politics. We exchange our thoughts, ideas, products, wastes, energy. We even exchange ourselves, by physically moving from home to business, to the market, to a favored holiday destination. As a 'social animal', our sense of identity and personhood is intimately bound to the manner in which we participate in the world at large.

But participation occurs not only in the human sphere. Taking the expanded definition I offered above ('to possess deeply something of the nature of a thing, and simultaneously to give something of oneself'), then participation occurs throughout the natural world. Clearly all animals, as active, responsive entities, are participators, strongly within their given species, less strongly with other animals and plants in their ecosystem. They even participate to a degree with the soil, rain, and air; animals take in oxygen and water, exhale carbon dioxide and perspiration, and return their bodily wastes to the Earth. And then, by a principle of 'participatory symmetry', it is apparent that plants, soil, air, and water also participate in the natural world. They each give something of themselves to other parts of the ecosystem, and they receive into themselves something from the ecosystem.

Thus there is a sense in which all objects in the world participate with other objects around them. The natural world -- the world of physical objects, of matter and energy -- is a participatory world. Participation is a completely and entirely natural process. To this statement, one might counter that participation in this sense doesn't mean very much, that it is the same as saying that the physical world is continuous, is causally connected, and so on, nothing more than what contemporary physics tells us about the world. This would be true, except for two critical, and related, points: one, *mind* is seen as having a fundamentally interactive role, and two, participation in my sense claims that, through exchange, something emerges from the background: a sense of unity and identity among the participants. The nature of this unity and identity will become clearer as I proceed.

So if the world of matter participates, we can rightly speak of *Participatory Matter* as being a constituent of reality. By 'matter', here, I mean simply in the sense of modern physics -- the 'physical matter' of the universe, considered to consist of mass and energy. Participatory Matter is one fundamental aspect of what we may call Participatory Reality.

There is a second, equiprimordial aspect to Participatory Reality. This is *mind* -- the mind of the participator, and the mind that emerges through participation. Participation necessarily involves a subject: the one-who-participates. More often than not we use the word in reference to people, occasionally to animals, and only rarely if ever to inanimate things. If we consider the common anthropocentric usage, participation is something done willingly by a person. The person actively and freely chooses to join in with an activity, to share in something, or (more passively) to accept something. Thus there is an element of agency, of deliberate action, on the part of the subject. If we disallow for the moment instances of 'unknowing' or 'unwilling' participation, we may say that to participate is to make a mental, conscious decision to become involved. Even in this basic sense, 'mind' plays a key role.
Furthermore, there is the deeper sense in which the *participatory process itself* is seen as mind-like. In the human realm, we freely choose to become, if only for a time, one member of a larger group. We give something to others, we receive something from

them, and in the process we achieve something not possible without such an interaction. This 'something' that emerges from the group also has a mind-like nature, not unlike that of our own individual minds. Ultimately, I will argue that the mind of the individual and the mind of the process are of one nature, and describable in similar terms.

Thus, despite claims of the 'eliminativist' school of philosophy, I take mind to be an eminently real phenomenon of the world. It coexists with, for example, our physical bodies, yet it itself seems not to be physical. There is the ancient question in philosophy as to whether mind reduces to, or is logically entailed by, the physical, *or* whether mind is something completely distinct which must interact with the body. I deny both these alternatives, and will pursue a different theory in which they are connected yet distinct aspects of reality. At this point, let me simply state that I see mind as real, as non-physical, and as equiprimordial with matter. I shall refer to mind in this sense as *Participatory Mind.*

These two equiprimordial realms seem to dominate our experience of Participatory Reality. However, I do *not* claim that these are the *only* aspects of Reality. There may well be others, perhaps infinitely many so. In fact, we have some interesting evidence for at least a third distinct aspect of Reality, as I will explain in Part III. But for the most part I will adopt a rather Spinozist orientation, accepting the view that something like Mind and something like Matter are essentially all we know about the total Reality.

To summarize: in what we may call Participatory Reality, there exist at least two fundamental features -- Participatory Mind, and Participatory Matter. The two are intimately connected. Let me introduce two new terms to address these concepts: taking the Latin bases, we may call the realm of Participatory Mind the 'Partimens'; and similarly, we may refer to the realm of Participatory Matter as the 'Partimater'[8]. So we have the Partimater comprising the physical world of mass and energy, and the Partimens comprising the world of mental states and mind, and these two realms together constituting, in essence, all that we commonly call real.

4) Wheeler, Skolimowski, and the Modern Origins of the Participatory Worldview

The philosophical application of the term 'participation' is very old, going back at least to ancient Greece. Plato, for example, explored the ways in which the contingent physical world participates in the realm of the Forms (more on this in the following section). Other early intellectuals advanced ideas related to participation as well, emphasizing the active power of Mind or the ontological commonality of all things. The concept of participation continued to evolve in various forms up to modern times. Into the 20th century, thinkers such as Schiller, Levy-Bruhl, and Merleau-Ponty saw significance in the idea of participation. Merleau-Ponty, for example, related it to the Heideggerian sense of 'being-in-the-world': "we are linked in relationships with ourselves and others. In short, we experience a *participation in the world...*" (1945: 395).

But the term 'participation' in reference to a new worldview has decidedly modern origins, and goes back to 1972. During the week of September 18, in Trieste, Italy, there was a conference of physicists called the "Symposium on the Development of the Physicist's Conception of Nature in the 20th Century". Among those attending was the avant-garde physicist, cosmologist, and philosopher John Archibald Wheeler. Wheeler had been engaged in high level theoretical physics for many years, addressing issues of particle physics, quantum mechanics, black holes, and other esoterica. He was rarely content to perform mere theoretical analysis, and one can find in most Wheeler articles at least some degree of philosophical inquiry, of putting his physical insights into a larger perspective.

Wheeler's presentation, published the following year, was titled, "From Relativity to Mutability" (Wheeler, 1973). His main point was that the laws of physics are dependent on the structure of space-time, and that, since the universe of space-time is predicted to collapse at some point in the distant future, the laws of physics themselves must 'collapse', change, and become transcended: "With the collapse of the universe, the framework falls down for every law of physics." (p. 241). Therefore, "Ultimate MUTABILITY is the central feature of physics." (p. 242). Thus, relativity, gravity,

black-body radiation, all must be "given up" as ultimate principles of the physical universe.
So, he argues, "almost everything goes", and , "if law goes, what can replace it but chaos?" (p. 243) Wheeler is led to the belief that the universe must return to a state of "primordial chaos", a "pregeometry", from which law can be rebuilt[9]. Interestingly, Wheeler claims that not everything must be cast to the winds upon the collapse of the universe; even amidst this ultimate chaos, "one principle remains, the quantum principle." (ibid) The reasons for this are partly technical, partly subjective assessment, but he is clear in his conviction on just how central the quantum principle is to any possible universe.

Then on the last page of the article he articulates for the first time a cornerstone of his emerging philosophical vision:

> Nothing is more important about the quantum principle than this, that it destroys the concept of the world as 'sitting out there', with the observer safely separated from it by a 20 centimeter slab of plate glass. Even to observe so minuscule an object as an electron, he must shatter the glass. He must reach in. He must install his chosen measuring equipment. ... Moreover, the measurement changes the state of the electron. The universe will never afterwards be the same. To describe what has happened, one has to cross out that old word 'observer' and put in its place the new word 'participator'. In some strange sense the universe is a participatory universe. (pg. 244)

Thus does Wheeler introduce the modern conception of the Participatory Worldview.

It must be kept in mind that Wheeler's context is that of physics, and he was not the first to recognize these implications of quantum mechanics. The essential ideas go back to Heisenberg and Bohr. They too argued that 'measurement changes reality'. But they did not fully appreciate the philosophical consequences, and did not articulate the larger implications.

Wheeler refers to quantum mechanics, and in particular, the Schroedinger wave equation. This equation describes the time evolution of a subatomic particle, and it does so, like all other laws of physics, in completely deterministic terms -- until one attempts a measurement. Then, in some interpretations, there is a 'collapse' of the wave equation, in which one of many possible futures of the particle becomes realized. Such quantities as the particle's position or momentum (energy) do not become precise, or perhaps do not even exist, until someone makes a conscious decision regarding what and how to measure, then "reaches in", takes the measurement, and thus actively affects the state of the particle – and hence the universe.

Wheeler senses the philosophical implications here. He goes on to ask, "Are we 'actually bringing about what seems to be happening'?" He then quotes Parmenides: "what is, ...is identical with the thought that recognizes it" (ibid). Wheeler's idea here is that 'mind' participates in, and in a sense determines, 'matter'. Or as I may put it, the Partimens co-evolves with the Partimater, and co-defines it. As a final observation, Wheeler acknowledges that he is at the limit of what can be explained by physics alone: "Now more than ever one is certain that no approach to physics that deals only with physics will ever explain physics." (ibid). In other words, *metaphysics* is essential to understanding the universe.

Throughout the 1970's and early 1980's, Wheeler continued to promote and articulate his conception of the participatory universe -- see particularly his articles "Universe as a Home for Man" (1974), "Genesis and Observership" (1977), and the compilation piece "Law without Law" (1983). In "Genesis and Observership", Wheeler describes the universe as giving rise to the observer-participator, who in turn brings meaningful existence to the universe. The central point, reiterated in subsequent articles, is that "billions upon billions of acts of observer-participancy [are] the foundation of everything" (1981: 186).

Wheeler does not explicitly tell us who or what is making the observations. To my knowledge, in all his writings Wheeler consistently maintains an anthropocentric stance, never considering whether, for example, animals or plants can act as observer-participants and create meaningful existence. Nor does he consider the reciprocal effect back on the participator[10]. These seem to me to be key elements of a fully-developed participatory worldview, and hylonoism provides this missing dimension.

* * * * *

I have offered up Wheeler as a leading figure in the development of the terminology and present conception of the Participatory Worldview. Actually, the vision of the participatory universe was anticipated some five years before Wheeler's 1972 conference by the philosopher who has made the most progress in articulating the philosophy of participation, Henryk Skolimowski. In December of 1967 Skolimowski attended and presented at the 2nd International Colloquium on Biology, History, and Natural Philosophy, in Denver. Skolimowski's contribution was titled, "Epistemology, the Mind, and the Computer", which was subsequently published, coincidentally, in 1972 (see Skolimowski, 1972). In this paper Skolimowski argues against materialist reduction of the mind to physics, and instead challenges us "to be bold and imaginative and propose theories which account for the complexity and intricacy of [mental] phenomena but which are less susceptible to direct empirical scrutiny." (p. 303).

After presenting a number of arguments against the premise of 'strong artificial intelligence' -- that a computer can duplicate the capabilities of the human mind -- Skolimowski articulates a theory of interaction between *knowledge* and the *mind*. For Skolimowski, 'knowledge' is the sum total of our understanding of reality; in a sense, for us, it *is* reality[11]. He writes in terms of "scientific knowledge", but the reference is clearly to all fundamental knowledge of reality. Skolimowski's central point is that there is a continuous interaction between mind and knowledge, such that both are evolving and changing together. He states, "There is a parallel conceptual development of the content of science and the inner mental structures of the mind." (p. 325). Knowledge works on the mind, and conversely, mind changes knowledge. He lays out his position concisely:

> At this point we must assume that there is a parallel conceptual development of our knowledge and of the mind. Knowledge forms the mind. The mind formed by knowledge develops and extends knowledge still further which in turn continues to develop the mind. Thus there is a continuous interaction between the two. ... [K]nowledge and mind are functionally dependent on each other and indeed inseparable from each other. They are two sides of the same coin ... (ibid)

The linkage between these two is language: "In language we witness the culmination and crystallization of two aspects of the same cognitive development: one aspect related to the content of science [i.e. knowledge]; the other aspect related to our acts of comprehension of this content [i.e. mind]." (p. 324). Thus, via language, mind interacts and co-defines itself with knowledge of reality.

At this early point in his conception of the participatory mind, Skolimowski had not yet substituted 'reality' for 'knowledge', but this comes out clearly in his later writings. But there are hints of this view even here in his early work: "Every new hypothesis is an invention of a new possible world." (p. 327). Skolimowski also seems to understand the broader implications that are unfolding. He introduces the term "conceptual net" to represent "the totality of concepts and their relationships" (p. 325). This is a clear reference to the idea of a 'worldview', of a total picture of reality. He compares the conceptual net to Kuhn's "paradigm", but states that "the conceptual net is more comprehensive than the paradigm; it determines not only the nature of scientific problems but also the nature of scientific frameworks, or paradigms" (p. 328). Something larger and broader than a paradigm is emerging from this view of mind; it is a total picture of the cosmos, a truly new worldview that was captured five years later by Wheeler with his phrase "participatory universe".

Skolimowski became aware of Wheeler's ideas in the mid-70's, at which point he was in the midst of developing a highly-original version of environmentally-based philosophy known as 'eco-philosophy'[12]. He returned to the subject of participatory mind in a seminal 1983 article, "A Model of Reality as Mind". Here Skolimowski makes the key replacement of 'reality' for 'knowledge'. He further articulates his theory of mind, called here the "evolutionary transcendental theory" of mind, or more briefly, the "ecological theory". Skolimowski is clearly laying out a radical new vision of mind, and the role that mind plays: "there is a most intricate feedback between reality and mind; that each co-define the other, and indeed *reality can be conceived as a form of mind*" (p. 774; my italics). He argues that mind is not just active, it is creative -- or more precisely, co-creative: reality forms and molds the mind, and likewise mind creates meaningful reality. Furthermore, reality, as a "form of mind", possesses certain powers of co-creativity. After all, the brain – which is the central organ of the mind – is obviously a part of material reality, and must play a key role in the process of knowing. One is led to ask, in what sense does this one piece of material reality (the brain) co-create with reality, and how does it compare to other parts of material reality, or matter in general. Skolimowski does not address this issue; hylonoism attempts to illuminate it.

In Skolimowski's interpretation, the means through which mind co-creates are its *sensitivities*. The person is conceived as consisting of a "field of sensitivities" through which we interact with our environment. Our evolution is essentially the story of evolving sensitivities, the acquisition of ever-greater abilities to know the world. The sensitivities include the five bodily senses, but also incorporate all our mental abilities for grasping and internalizing the world. Until we absorb into ourselves a piece of reality, that piece, for us, simply does not exist: "No eye to see, no reality to be seen." And furthermore, the visual reality brings the eye into existence:

> The existence of the eye and the existence of the visual reality are aspects of each other. One cannot exist without the other. For what is the seeing eye that has nothing to see? And what is the visual reality that has never been seen? ... There is no more to reality (for us) than our sensitivities can render to us. (pgs. 777-8)

Skolimowski stresses the error of the conventional objectivist view of reality as existing 'out there', independent of how it is perceived:

> What is beyond the [human] species and the mind of the species may be reality *in potentio* but not reality as we know it; our concept of reality is reality as we know it. ... In processing [reality], the mind actively transforms reality. ... There is no such thing as *reality as it is*... Reality is always given together with the mind which comprehends it... We have no idea whatsoever what reality could be like as it is, because...*reality is invariably presented to us as it has been transformed by our cognitive faculties*. (pp. 779-80)

Two other interesting and relevant points in this article: one, Skolimowski denies that his theory of mind is a version of philosophical idealism, preferring to coin a new term: "The ecological theory of mind is not an expression of old-fashioned idealism which denies or mystifies reality. It is rather an expression of suprarealism. For it accounts for all the stages of the real in its evolutionary unfolding..." (p. 782). (Idealism, as a philosophical concept, is the view that all things are fundamentally 'mind', or are reducible to mind).

The other point of interest is that Skolimowski does not cite Wheeler and his participatory universe proposal, choosing instead to make a passing reference to the concept by noting that, in the new worldview of particle physics, "the observer and the observed merged inseparably" (p. 787). This is as close as he gets here to directly citing the concept of 'participation', although the meaning and intent clearly permeates his ecological theory of mind.

Things begin to change just one year later when he publishes The Theatre of the Mind (1984). Here one finds explicit reference to the new terminology: "Thus we live in the *participatory* universe, not in the objective one." (p. 15). Yet, the concept of participation still plays a minor role here; he discusses it once more briefly at the end of the book (p. 161) where he cites the Wheeler passage quoted above. Skolimowski furthers his commitment to the concept the following year, when he presents (in 1985) a lecture titled, "The Co-Creative Mind as a Partner of the Creative Evolution"[13]. He embraces the new terminology, referring to his theory as the "participatory-evolutionary mind", and making reference to the "holistic-participatory cosmology" and the "evolutionary-participatory logos" (1988: 58). And, he broaches the concept of a specific mode of investigative inquiry based on this new participatory philosophy, which he calls "the Methodology of Participation" (p. 59). It was in the spirit of this fundamentally new research methodology that programs such as 'participatory action research' were initiated in the 1980's.

Over the next few years Skolimowski continued to develop his vision of a participatory philosophy -- see his (1991, 1992, 1993). His thinking culminated in 1994 with the release of an entire book dedicated to articulating his new philosophy, The Participatory Mind. Along with his Eco-Philosophy (1981), this is probably his most original and profound work. I provide a detailed analysis in Chapter 6, but briefly, Participatory Mind puts forth a radically new ontology in which mind and reality are seen as two aspects of a single entity, "mind/reality"; this theory Skolimowski calls "noetic monism". His participatory ontology leads to a complete worldview, in which theories of epistemology, methodology, and truth are united under the framework of participation.

Let me just note here that Wheeler and Skolimowski are not the only recent figures to emphasize the philosophical importance of participation. Physicist David Bohm took up Wheeler's suggestive ideas and further explored the role of participation in quantum mechanics – see my discussion in Chapter 7. Berman (1981) examines the importance of the idea of participation, and Abram (1996) also sees it as an essential part of a new worldview. Reason and Rowan (1981; and Reason, 1994), among others, see in it the basis for a completely new approach to research methodology[14]. Again, these works will be explored in subsequent chapters.

5) Some Early Elements of Participatory Philosophy

Skolimowski and Wheeler made explicit the philosophical concepts surrounding participation as I have defined it here, but they each had their own intellectual predecessors. For Wheeler it was the cutting-edge physicists and the architects of the 'new physics', those who had the vision to articulate the deeper meanings of their discoveries -- people like Bohr, Heisenberg, Schroedinger, Everett, and Wigner. For Skolimowski it was the line of philosophers who saw mind as actively engaged in determining the nature of reality, and who challenged the dominant ontology of materialism -- James, Bergson, Whitehead, Popper, and Teilhard; not to mention the inspiration of the early Greek thinkers.

Both Skolimowski and Wheeler represent the culmination of these two broad lines of inquiry -- those of philosophy and the physical sciences, respectively. This split is a relatively recent phenomenon. Prior to the mid-1800's science and philosophy were much more closely related, and individual thinkers more likely to be expert in both fields -- and to create original and insightful ideas. People such as Gustav Fechner (1801-1887) and Ernst Haekel (1834-1919) were among the last to creatively integrate both the scientific and philosophical perspectives of nature. It is, in fact, one of my objectives in this thesis to further reunite insights from these two now-divergent lines of inquiry.

An examination of the physical sciences branch requires a detailed look into aspects of physics, and this I defer until later. Likewise, the philosophical branch calls for an examination of the relevant ideas from several individuals. This is best addressed in conjunction with the whole line of philosophical thought known as panpsychism, which stretches from its early origins in ancient Greece, through the Renaissance and Baroque periods, into modern times; the entire of Part II is dedicated to this task. In the remainder of this introductory chapter, I return to the beginning of Western thought. I briefly examine a few ideas of the early Greek philosophers, to see how they set the stage for the development of a Participatory Worldview.

Participatory thought in ancient Greece was, naturally, quite different from that envisioned by Wheeler and Skolimowski. It did, though, possess the general qualities of *sharing*, of *partaking*, and of *interacting*. As such, the Greeks were the first to articulate the beginnings of the concept of Participatory Reality. As with panpsychism, this aspect of their thought is generally under-examined and under-appreciated, in part because it is seen as superficial or irrelevant in light of the physicalist worldview that has dominated modern philosophy over the past 100 years.

Broadly speaking, the Greek concept of participatory philosophy generally, and panpsychism in particular, can be examined in three parts: that of (1) the pre-Socratics, (2) Socrates, Plato and Aristotle, and (3) the Stoics[15]. Here I want to make just a few brief observations on the first two of these groups, beginning with the pre-Socratics. Of the perhaps 20 or so major philosophers who lived before the time of Socrates, three contemporaries stand out as envisioning an active, participatory role for mind -- Parmenides, Anaxagoras, and Empedocles.

Parmenides (515-460 BCE) was the leading figure among the group of philosophers known as the Eleatics. He was the first to focus directly on mind and its active role in the world. In his principal work, "On Nature", Parmenides advocates the view that the stuff of the 'objective' world is really an aspect of mind, and is actually in a sense equivalent to mind. Writing on the ancient Greeks, T.V. Smith makes special mention of Parmenides' "concept of Being, which he identified with thought" (1934: 9). In a key fragment, Parmenides states that "thinking, and that by reason of which thought exists, are one and the same thing..." (ibid, pp. 16-17). This identification of being and mind is among the very first hints of a participatory worldview within Western philosophy. Mind, in some sense, is equated with reality; therefore, *no mind, no reality*. This insight was inspirational to both Wheeler and Skolimowski, and both have cited it.

Anaxagoras (500-428 BCE) expanded on this notion of an active mind, making it the centerpiece of his entire philosophy. For him, mind is the central ordering principle of the world. In the words of Smith, "According to Anaxagoras, there is a countless number of original elements, qualitatively unchangeable, which are combined and separated by the ubiquitous power of mind." (p. 27). This view comes out in the fragments of his writing; the following quotes are from Fragments 6 and 7, as cited in Smith:

> And whatever things were to be, and whatever things were, as many as are now, and whatever things shall be, all these mind arranged in order; … [M]ind ruled the rotation of the whole, so that it set it in rotation in the beginning. … Rotation itself caused the separation… And when mind began to set things in motion, there was separation from everything that was in motion, and however much mind set in motion, all this was made distinct. (p. 34)

Interestingly, this view of mind as the central ordering principle of the universe was apparently compelling to the young Socrates. In the Phaedo, Socrates exclaims, "[Anaxagoras' theory of mind] delighted me and it seemed to me somehow to be a good thing that mind was responsible for everything …" (97b-c). Even though Socrates later abandoned this view – "this splendid hope was dashed" – it was because Anaxagoras had failed (in the mind of Socrates – or was it perhaps only Plato?) to address certain key implications, and not because of any inherent weakness in the position itself. Intuitively, Socrates (and perhaps Plato as well) evidently felt that this was on the right track.

Empedocles (495-435 BCE) was the dominant figure of the pre-Socratics, from a participatory-panpsychist viewpoint. So many of his ideas were seminal to later thinkers, and there are a number of deep and profound intuitions in his work. His writing focused more on aspects of panpsychism than on the explicit role of the human mind, and I will cover these ideas more thoroughly later. One fragment is relevant for my purposes here, and it is based on Empedocles' belief that we know things by virtue of *sharing a like nature*. Both we ourselves and the objects around us share in certain common fundamental elements: these are the four material elements of Earth, Water, Air, and Fire (which Empedocles was the first to articulate). It is through our common participation in these basic elements that we are connected to things, and that we, in a sense, bind and merge with them. In a famous and beautiful passage he says:

> For by earth we see earth, by water water, by ether bright ether, and by fire flaming fire, love by love, and strife by mournful strife." (cited by Aristotle, De Anima, 404b11).

'Love' and 'Strife' are the two fundamental forces in the Empedoclean system, and again it is through mutual participation that we come to know these. This passage is the earliest known articulation of the view that 'like knows like', and is one of the first formulations of a participatory epistemology. Knowledge is seen as possible only by mutual participation in the common elements of reality.

* * * * *

Turning to the dominant Greek thinkers: Socrates, as we know, was not much of a metaphysician. He dwelt more on the moral aspects of philosophy, and on the nature of the 'good life'. His method of teaching, however, was unique; the famed Socratic Method of inquiry was highly interactive and cooperative, and focused on joint learning in the context of the individual student rather than on the expounding of eternal truths. This approach embodies the essence of participatory inquiry. Socrates was in fact the first practitioner of a *participatory methodology*, the spirit of which carries on today in the field of 'participatory action research'[16].

Plato (428-348 BCE) was perhaps the first explicitly participatory philosopher. In a number of works he develops his famous theory of the Forms – ideals of Justice, Beauty, Being, and so on, of which each specific instance in the 'real' world is a reflection or image. The relationship between things and the Forms is described by Plato as one of *participation*, as things *partaking or sharing of the Forms*.

We find this most notably in two of his dialogues, the Phaedo and the Parmenides. In the Phaedo, Plato writes of "sharing" in the Forms. For example, he says, "[I]f there is anything beautiful besides the [Form of] Beautiful itself, it is beautiful for no other reason than that it shares in that Beautiful" (100c). And a bit later he elaborates:

> [Y]ou do not know how else each thing can come to be except by sharing in the particular reality in which it shares, and these cases you do not know of any other cause of becoming [for example] 'two' except by sharing in Twoness...as that which is 'one' must share in Oneness... (101c)

Then in Parmenides he switches over explicitly to the term 'partake' to describe this type of interaction between things and Forms. A youthful Socrates is explaining his ideas to his elder teacher, Parmenides: "[A]ll things are 'one' by partaking of oneness, and that these same things are 'many' by partaking also of multitude ... I'm one person among the seven of us, because I also partake of oneness." (129b-c). Socrates goes on to explain that "these forms are like patterns set in nature, and other things resemble them and are likenesses; and this partaking of the forms is, for the other things, simply being modeled on them." (132d). Participation is thus seen by Plato to have a deep metaphysical significance, as the process by which the Ideal is incorporated into the Phenomenal.

This must suffice as a brief prelude to the concept of participation. I hope to have shown in this cursory introduction something of both the earliest and latest thinking on the subject. As I have indicated earlier, two central precursors of participatory thought – panpsychism and modern physics – require separate and detailed treatment later. It remains for me to connect these temporally and conceptually distant ideas, and form a cohesive picture of participatory philosophy in the 21st century.

At this point I return to recent developments, and explain in some detail the mathematical basis for my hylonoetic theory. Although this is counter to the chronological order, I think it is more helpful to have in mind the main elements of hylonoism as I explore the relevant history of panpsychism. The reason for this is that *both concepts help to illuminate the other.* Having in place a hylonoetic theory of mind, I can give a new reading to many ancient ideas. In fact, there are a number of surprising similarities between hylonoism and the various panpsychist theories of mind that I examine. I take this as a positive sign; for if there is an underlying truth to panpsychism, we should expect to find similar insights made by thinkers of all ages. And in fact we do.

The basis for hylonoism is centered on the process of exchange between systems of *mass* and *energy*. As such, it is helpful to inquire deeper into the history and meaning of these two terms. This is the primary subject of my next chapter.

NOTES:

[1] The very idea of 'articulating a worldview' has been challenged at a fundamental level by the deconstructionist wing of postmodernism (cf. Harvey, 1990). Deconstructionists argue that all such attempts contain internal contradictions that preempt their validity. They see all larger schemas as culturally and temporally relative (in spite of their own claims that they are not relativists). Ultimately, this is a futile position; worldviews do exist, and they are the set of the largest, deepest shared assumptions about the world within a given culture. There is a grain of truth in the deconstructionist position, in that no worldview is 'ultimate' or absolute. Worldviews evolve, interact, and change. Whether individuals can in fact affect this process is a different issue, which I cannot address here.

[2] The context of what follows in this thesis is that of Western Civilization. Apart from a few scattered remarks, I will generally not be addressing Eastern perspectives.

[3] I am not the first to make this claim. At least four other contemporary writers have put forth a similar argument: Berman (1981), Sheldrake (1990), Abram (1997), and Goerner (1999). I will discuss these works later, but in general the present thesis shares little of their approaches. The central theme may be similar, but the treatment and articulation are very different.

[4] Some writers argue that the exchange of *information* is key, rather than energy – see Bateson (1972), Wheeler (1990, 1994), or Chalmers (1996). I see information as an

unnecessary restriction on the more general exchange of mass/energy. In a sense, they come to similar interpretations, as I will explain.

[5] For completeness, one should also include non-rational approaches, such as intuitional or mystical. I will generally not be addressing these approaches here.

[6] This is traditionally opposed to the usual folk/religious ontology of *substance dualism*, of a physical world coexisting with an independent and eternal realm of the spirit.

[7] Per Webster's New Collegiate Dictionary, 1981

[8] Partimens comes from *particeps*, 'participate', and *mens*, 'mind' – pronounced "par-TIM-ens". Partimater is similarly coined, with *mater* being the Latin root for 'matter', and, appropriately, 'mother' -- pronounced "par-TIM-a-ter".

[9] This vision makes an interesting connection to the ancient mythology of Hesiod, who wrote that the universe was born in *khaos*, the primordial void -- see Chapter 2; thus we can envision a compelling symmetry: the universe *arising from*, and *returning to*, a state of pure and ultimate chaos. This is a kind of anti-evolutionary or anti-teleological vision; it has its own merits, but I will not explore these here.

[10] Except in a very general sense, in which he argues that the universe evolved in order to produce humans capable of observership. This is akin to the 'anthropic argument'.

[11] Skolimowski's full discussion of the identification of knowledge (mind) and reality occurs in his 1994 magnum opus, The Participatory Mind (Penguin/Arkana Books). For a fuller discussion, see my comments in Chapter 6.

[12] See his Eco-Philosophy: Designing New Tactics for Living (1981). Skolimowski cited Wheeler (1974) in this work, but did not refer explicitly to the passage on 'participation'.

[13] See Skolimowski (1988) for published citation.

[14] Participation has begun to change our research and methodological approaches to learning. The most active field has been that of *social research* (as opposed to research in the hard sciences). This new method of inquiry goes by a number of related terms – including 'participatory research', 'action learning', 'action research', 'action science', 'human inquiry', 'co-operative inquiry' – but one branch in particular has been inspired by participatory philosophy: *participatory action research* (PAR). PAR seems to have been particularly successful, and Reason (1994: 327) calls it the "most widely practiced participative research approach".

PAR is an outgrowth of the older concept of 'action research' that originated in the work of Kurt Lewin in the 1930's and 40's (for a good overview and history, see Greenwood and Levin, 1998). Lewin began the break from the assumption of 'dispassionate researcher' and instead sought to use research to change and improve social systems. He involved himself in the experiment, and made clear his intentions to play an active role. As early as the mid-1930's he wrote of the importance of "action wholes" (1935: 173), and shortly thereafter he discussed the role of "directed action" and "action toward the goal" (1938: 108, 129) with respect to motivations of human behavior. Later he moved toward a group-consensus approach that sought not just knowledge *per se*, but an improvement or resolution in a problem situation (see Lewin, 1946); his was an *activist* methodology.

Less well known is that Lewin's action research was grounded in the pragmatist philosophy of the late 19th century. Peirce (1878) was the first to argue that the primary end of philosophy is *action*; truth and meaning were to be found in "practical consequences" (1905/1934: 6). James, Schiller, and Dewey further elaborated this 'action philosophy' that emphasized the real-world effects of inquiry. Philosophy was not some pursuit of an abstract, 'objective' reality but rather was a process of co-creating reality, one that could be measured in terms of human satisfaction and well-being. Lewin took this philosophical principle and applied it to actual research.

Action research went largely dormant in the 1950's and 1960's, but resurrected in the late 70's. By the early 80's the term 'participatory' came into play, to express the active involvement of the researcher(s) and participants. Additionally, PAR came to incorporate an ideological commitment toward inclusion, empowerment, and social justice. Not only was it "value driven" (Levin, 1999: 27), but it recognized the inherent role of values in *all* types of research, including the supposedly 'value neutral' approach of the scientific method. PAR embraces the role of values, and as such is able to work toward equitable and life-enhancing solutions. Works such as Reason and Rowan (1981), Whyte (1984), and Reason (1988) were among the first articulations of PAR. In 1997 Heron and Reason (1997) performed a relatively comprehensive study of the philosophical basis for participatory research, drawing upon the work of Skolimowski, Berman, Abram and others.

[15] The reasons for this division will be made clear in Part II, when I discuss in detail the panpsychist views of the Greeks.

[16] See note 14 (above).

Chapter 2 – Concepts of Mass and Energy in Western Civilization

1) Matter and Motion

Throughout the remainder of this thesis, I will be making increasing references to basic concepts of physics -- especially, the concepts of 'matter' and 'energy' -- so it is appropriate at this point to go into some detail regarding the meaning of these and other related terms. I will avoid a technical discussion, limiting my approach to the philosophical implications of these concepts. Let me also add that I will take these two concepts in a relatively straightforward manner, as it is not my intention to make a deep metaphysical inquiry into what precisely we mean by the terms 'matter' and 'energy'. I treat these concepts essentially as modern science does, presuming that there is some meaningful sense in which we can quantify them and their effects. My main intention is to develop the philosophical significance of the basic elements of the physical world as it pertains to the emergence of the phenomenon of 'mind' in particular and to the Participatory Worldview in general.

The universe of the contemporary physicist is a world of material objects, and of energy. Matter and energy exist in a realm of 3-dimensional space, and they endure with varying degrees of stability throughout time. Matter and energy have been unified by relativity theory into a single substance, 'mass-energy'. Space and time have been unified, also by relativity theory, into a single 4-dimensional entity, 'space-time'. Thus, the modern physicist sees a universe that is quite simple and elegant: mass-energy (in various forms) moving through space-time.

This is the essence of the materialist worldview. Nothing exists except mass-energy, and space-time. Anything else, and anything not ultimately describable in terms of these elements, is unreal.

To better understand the full implications of a mass-energy universe, I will first explore the history of these concepts. The study of matter and energy goes back to the earliest days of our civilization. The ancient Greeks were among the first in human history to take a deep, rational look at the world around them, and to attempt to draw some general conclusions. In striving to understand the natural world, the Greek philosophers sought out the *essential principles* of nature; they asked the most basic questions; and they sought to unify the diversity of phenomena into a single comprehensive theory or vision.

Their line of inquiry was shaped by the primordial worldview into which they were born. This determined the starting point. As with many early cultures, the Greeks inherited a worldview of diverse material objects ruled and influenced by a pantheon of gods. This worldview seemed to account for human and natural events in a semi-comprehensible manner. Then around 600 BCE certain Greek thinkers began to depart from this worldview and ask different questions. They took an intellectual 'step back', and adopted a new perspective; they saw a world that consisted, in its essence, of *things that move*.

Once seeing the cosmos as composed of 'things that move', two central lines of investigation open up. One naturally wants to know: (1) what is the nature of 'things': what do they consist of at root, what are their properties, and how do they acquire these properties; and, (2) what is the nature of 'movement': how and why do things move, and what is the nature of the interaction between any such 'motive force' and material objects. And in fact, much of Greek philosophy is dominated by these two general lines of inquiry. Certainly *physis* (physics, or the study of nature) was, and even ethics was also to a large degree shaped by one's view of the natural world; as, for example, F. Sandbach said of the Stoics, "The question of right conduct could not be settled without understanding the relation of man to the universe." (1975: 14). Even logic, the third traditional branch of philosophy, was developed in large part to make clear one's arguments about *physis*.

This study of 'things that move' was the first step in the articulation of a new 'logos' worldview. This was a rational view of the world, based on basic principles that could be grasped by ordinary mortals. Some of the mystery and capriciousness of the mythic worldview had faded, and in its place was a worldview in which human kind was more naturally integrated. Humanity was seen as a more fundamental part of the whole cosmic picture, not merely as a resident of the 'mortal plane', while gods ruled on high from the 'spiritual plane'. Granted that the mythic world had its own sense of integration, but this was in a relatively naïve and innocent sense. Logos represented a whole new direction in human thought, one in which humans were rationally integrated into the very processes of the universe. This, I claim, was the first step on that detour of thought that led to the Mechanistic Worldview, and which even now is evolving into the Participatory Worldview.

The fundamental ontological status of 'things' and 'movement' formed the basis of the emerging scientific worldview. Robert Boyle, writing in 1674, said, "I...observe that there cannot be fewer principles than the two grand ones of our philosophy, matter and motion." (Matthews, 1989: 113). This situation has continued even through the present. Our modern mechanistic worldview, the one that sees a universe consisting solely of 'mass' and 'energy', has clear parallels to this ancient Greek vision of 'things that move': 'things' are composed entirely of mass, and 'movement' is the essence of energy. So in a sense, we still have not moved beyond this primitive view. But the Participatory Worldview is clearly becoming articulated, and I see the ancient Logos view as an entirely appropriate place to start.

2) *Philosophia Materia* — Historical Perspectives

Let me begin with a brief examination of 'matter'. Matter, originally, meant wood. Wood was the prototypical 'stuff' which people used to make things. The word 'matter' comes from the Latin *materia*, which had as its root meaning 'the hard inner wood of a tree'. *Materia* itself came from the even older word *mater*, or 'mother': the inner wood was considered to be the mother of the new outer growth, which was relatively soft and pliable. Thus, *materia* had two essential characteristics: it was a *living* substance, and it was a *generative* substance; both of these notions are highly evocative, and are relevant to the discussion at hand. Over time it expanded its usage, and came to denote not just wood, but any generic material, and this is the meaning that was carried into English from the late 1500's on.

Interestingly, the Greeks also had a word for 'substance', and this word also meant wood: *hyle*[1]. One can clearly see why this is a cross-cultural occurrence; most every early human society had access to wood, and it would have been a near-ideal substance for making things from. As in Latin, the meaning of *hyle* grew to encompass a broader meaning, roughly equivalent to our 'stuff', 'substance', or 'matter'. In Greek philosophy, Aristotle was the first to refer to *hyle*, meaning both 'that out of which something has been made', and 'that which has form'. *Hyle* has a very small legacy in English. In prefix form, we have such words as hylism (meaning 'matter as the original principle of evil', a doctrine attributable to Plotinus), Hylidae (a family of tree frogs), hylopathism (doctrine that all matter is sentient – related to pansensism, as discussed in Chapter 5), and hylozoism (doctrine that all matter is alive – more on this later). As a root word, it can be found in certain chemical terms, such as methyl, which is a combination of the Greek words *met* (wine) and *hyle* (wood), hence the term methyl alcohol (an alcohol distilled from wood) means literally, 'wood-wine'.

Philosophically, matter was important because it represented at least one fundamental aspect of reality. A theory of matter, in general, was therefore a theory of reality, or at least a portion of reality. The early Greeks explored two general lines of inquiry relative to matter: the essential, defining characteristics of matter (those that distinguished it from 'non-matter'), and, the type of substance or substances that matter consisted of.

This inquiry was linked, especially with the pre-Socratic philosophers, to another concept, *arche*. An *arche* is a 'first principle', and in particular, the first principle of the cosmos. This principle typically centered on the nature of the *materia* that composed physical reality. For example, the earliest pre-Socratic philosopher, Thales (625-545 BCE), argued that the *arche* was water, and that therefore all material things were composed of, or could be reduced to, water.

Most of the pre-Socratics, with the notable exceptions of Anaxagoras and Empedocles, argued that the *arche* consisted of a single basic entity or substance; they were ontological monists. If the *arche* was a single substance, then clearly 'matter' was to be viewed, at root, as this same substance. After Thales, for example, there was Anaximenes (585-525 BCE), who held that the *arche* was air. Heraclitus (505-450 BCE) made the claim that fire was the first principle of the cosmos.

Anaxagoras, as I mentioned in Chapter 1, put forth 'mind' as the *arche*. Mind for Anaxagoras was not the constituent of matter, but rather the guiding and organizing force. He held that matter consisted of an infinite number of substances, and that each was present in some small degree in every material object. Thus, Anaxagoras was the first to propose a pluralistic worldview, one with both (infinitely many) substances, and with the separate over-arching force of mind[2].

Empedocles, an older contemporary of Socrates, also argued for a pluralist view, though a more concrete one. He postulated a cosmos consisting of four elements – earth, water, air, and fire – interacting via two non-material forces, which he called "Love" (attraction) and "Strife" (repulsion):

> Hear first the four roots of all things: bright Zeus [fire], life-giving Hera [air], and Aidoneus [earth], and Nestis [water] who moistens the springs of men with her tears (frag. 6).
>
> And these [elements] never cease changing place continually, now being all united by Love into one, now each borne apart by the hatred engendered of Strife... (frag. 17).

These advances by Anaxagoras and Empedocles were significant developments; they were the first clear moves toward a modern conception of physics -- a universe of matter and of force.

As mentioned above, in addition to the type of substance comprising the *arche*, there was the question of its defining characteristics. Matter had two essential characteristics: first, it occupied space. Matter was a solid, impenetrable substance that completely filled some region of space. Matter defined as 'full space' has a number of logical implications, as Capek (1961: 55) explains: "If matter is full space, then its constitutive elements must be by their own nature impenetrable, indivisible, indestructible, rigid, and homogeneous." And in fact, this was the basic view of most pre-Socratics.

The second core property of matter, accepted by most all of the pre-Socratic philosophers, was this: *matter, to them, was alive.* This is the theory known as 'hylozoism', from *hyle* ('matter') and *zoe* ('life'), and the Greeks philosophers are rather infamous for articulating it. It was not merely some incidental quality, but was central to their view of the cosmos. Consider, for example, the early Milesian philosophers (including Thales, Anaximander, and Anaximenes), who in the 6th century BCE were the first to articulate the new Logos worldview. In summarizing the three key qualities of Milesian philosophy, Guthrie observes that "[The Milesian] view of nature was rational, evolutionary, and hylozoist." (1962-81, vol. 1, p. 140). He continues: "For the Milesians the union of matter and spirit in a material substance...is an assumption that raises no doubts and calls for no argument or defense." (p. 145). Later pre- and post-Socratics held related views, as we shall see. In spite of the infamy of hylozoism, this aspect of their philosophy is quite misunderstood, under-analyzed, and under-appreciated. The fact that even Plato, and perhaps Socrates as well, held similar views would likely come as a surprise to many readers; even Aristotle, whose theory of matter is clearly non-hylozoist, made some interesting claims about the presence of soul in the natural world. This issue requires much further elaboration, which I will detail in Chapter 5.

The view of matter as alive was challenged first of all by the Atomists -- Leucippus (485-425 BCE) and Democritus (460-370 BCE) -- and then given a major setback by Aristotle (384-322 BCE). The Atomist philosophy of nature held that small, indivisible atoms (*a-tomos*, meaning literally 'not divisible') were the essence of matter, and that these atoms swirled about in the void of empty space[3]. Atoms were found in a variety of types and shapes, and this variation accounted for the diversity of things.

In the traditional view, atomism is a purely materialist, virtually mechanistic ontology. However, there are some interesting claims to the contrary even here. Tallmadge, for example, has noted that Leucippus may well have inherited something of the Ionian hylozoist tradition: "It is not entirely improbable [that] the Atomism of Leucippus should be considered a species of hylozoism." (1944: 186). This view is supported by the writings of Democritus, as I will show later.

Aristotle was different. His inquiry and conclusions deeply undermined the hylozoist view. He equated matter with potentiality, that is, of having the capacity to receive a given form. Matter itself was neutral and inert. Aristotle supported the four-element theory of Empedocles[4], but modified it such that each element consisted of both matter and form. The 'life force' present in animals and plants was seen by him as an 'essential form' of their being; this was his definition of soul. Thus it was not an essential property of matter in general, and therefore matter as such was not 'alive' as it had been for most of his predecessors.

Thus, the legacy of ancient Greece produced *two fundamentally opposing views of matter*: the Aristotelian view of matter as inert and lifeless, and the hylozoistic view of matter as alive. As I mentioned, the latter view finds support in the writings of Plato. In his Timaeus (which served as the central Platonic text for much of the Middle Ages), Plato articulates the concept of the 'world-soul', the animator of the universe. Plato viewed the world/cosmos as "a truly living thing, endowed with soul and intelligence." (Timaeus, 30c). More importantly, individual objects possessed their own independent souls or minds. In particular, heavenly bodies, including the sun and the stars, were explicitly argued to possess souls[5].

Plato's conception of the animated universe, and by implication everything in it, was taken up by the Stoics. Circa 2nd century BCE, philosophers such as Zeno of Citium and Chrysippus developed a theory of matter based on Empedocles' four elements of earth, water, air and fire (though they largely abandoned his reference to Love and Strife). They viewed two of the elements, fire and air, as 'active' matter, and the other two as 'passive' matter. All material objects were composed of some combination of active and passive matter. This dual aspect approach has an interesting connection to our dual modern concepts of energy (active) and mass (passive).

The Aristotelian view of dead matter was carried on by the school of Scholasticism, which dominated philosophy for much of the Middle Ages. The medieval alchemists largely followed the Aristotelian conception, as they strove to 'fulfill the potential of matter' by transforming it into precious metals. All along, though, there was a persistent counter-movement of Platonists who kept alive the view of matter, and the universe, as endowed with soul and life.

Descartes continued to view matter as passive and inert; he famously defined it as a *res extensa*, something completely distinct from mind. Leibniz criticized this view, arguing that passivity could not account for change, action, structural unity, or causality. His response was to postulate the existence of 'monads' as the fundamental reality, which were active and even mind-like (i.e. self-moving) in nature. Leibniz's monadology was an essentially Platonic response to the dominant Aristotelian view.

Newton was of course famous for his mechanistic conception of the world, and it is commonly believed that he too viewed matter as something inactive and lifeless; surprisingly, though, certain comments by him indicate that he had doubts about this. In one rather backhanded but astonishing comment, he notes that "We cannot say that all nature is not alive" (McGuire, 1968: 171); more on this view of Newton's later.

His opinion on hylozoism notwithstanding, Newton made a quantitative breakthrough in defining the concept of *mass* as 'quantity of matter'. Mass was a common measure of all material objects, and was the critical element of his new theory of gravitational force. Mass was manifest to us as 'weight', but Newton recognized that weight was a function of Earth's gravity. Mass, on the other hand, was an 'independent' quality; it measured the amount of 'stuff' present in a given object. And it inherently produced its own gravitational field.

In the 18th century Kant reinforced the view of 'dead matter'. He played with the idea that matter may have some inherent activity or sensitivity, but ultimately ruled this out as inconceivable. Kant wrote, "[T]he possibility of living matter cannot even be thought; its concept involves a contradiction, because lifelessness, *inertia*, constitutes the essential character of matter." (1790: 242).

Interestingly, at about the same time Boscovich (1711-1787) began his formulation of matter as virtually 'immaterial'. In what would later become known as *dynamism*, Boscovich theorized that atoms of matter were essentially zero-dimensional points that were manifest entirely as a field of force. In effect, matter was nothing more than this force itself, and experimental evidence backed this view. This was the first modern step towards a conception of matter as equivalent to energy.

The "new physics" of the 20th century – including relativity and quantum physics – radically altered many of the ancient views of matter. Mass was no longer seen as indestructible, unchanging, and invariant; Einstein showed total mass of an object to be a relative concept, dependent upon one's frame of reference. Furthermore, the passive and active were unified when Einstein showed mass and energy to be fundamentally interchangeable. It became more appropriate to speak of 'mass-energy' as a single substance. Quantum mechanics described particles not as hard, impenetrable spheres, but rather as fuzzy clouds of probabilities; a particle like an electron could effectively 'exist' over a relatively large region of space, and one had varying degrees of likelihood of detecting it at different locations. Associated with this was the idea that atoms and other sub-atomic particles have a *dual nature* — they can be viewed as *particles* or as *waves*. This insight, attributable to DeBroglie, further emphasized the equivalence of matter and energy.

Advances in high-energy test equipment allowed researchers to push further inside atomic particles, and they are now able to distinguish sub-particles, called 'quarks', inside protons and neutrons. The current fundamental theory of matter, though aesthetically and intuitively unsatisfying, does an exceptional job of predicting physical phenomena. In the current standard model all matter is composed of two types of particles, 'leptons' and 'quarks':

1) Leptons — 6 kinds (includes the electron, and three variations of neutrinos)
   * considered to be "point-like, without structure"

2) Quarks — 6 kinds (up, down, top, bottom, strange, charm)
   * quarks are constituents of heavier particles like protons and neutrons, each with 3 quarks

In addition to these so-called 'mass particles', there are also 'force particles' which constitute the remaining aspect of physical reality; these are described in the following section. Physicists are currently seeking a more comprehensive and more satisfying theory of matter — 9-dimensional string theory being a hot candidate — to explain why these 12 particles are required, and perhaps how they derive from some simpler set of particles or forces. One thing is certain: this standard model is assuredly Aristotelian -- these particles are unquestionably without life, without soul, without mind.

However, the tag 'inert' has somewhat fallen by the wayside, certainly since Einstein equated matter with energy. Matter is seen as 'energetic', 'active', and 'dynamic'; the proton, for example, spins on its axis some 10^{22} times per second. And again the DeBroglie wavelength concept emphasizes the oscillatory, dynamic nature of all elementary particles of matter. Thus, the concept of *energy* has become equi-primordial to that of matter, and it has an equally long and intriguing history.

3) *Philosophia Energeia* — Historical Perspectives

With this background on the concept of matter, we can quickly trace the development of energy. The earliest philosophical reference to energy comes in the form of related terms, like 'motion' and 'force'. As early as Thales we find the idea that the capability of self-motion or self-energization is connected to the possession of a soul -- where

'soul' is interpreted as nearly interchangable with 'mind'. Thales famously noted that a magnet must possess a soul/mind, since it has the power of movement. This is our first indication that mind is somehow intimately and deeply connected with the concept of energy.
Heraclitus' *arche* of fire has obvious connections to energy. Fire/energy is not only the First Principle of the cosmos, but it is literally the fundamental stuff of the material world; "All things are exchanged for fire, and fire for all things" (frag. 90, in Smith, 1934:11). This fire is not the ordinary fire of the hearth, but is rather "an ever-living fire" (ibid), a life-giving energy, that is the root of everything. In the same vein, Heraclitus claimed that *'panta rhei'* – everything flows.

Anaxagoras reestablished the connection between mind and energy; mind as the *arche* was the 'organizing force' of the cosmos. At about the same time Empedocles was articulating his theory of the two fundamental forces, Love and Strife. In both cases we see a striking similiarity to modern-day views: of a universe of substances moved and organized by a small number of fundamental forces.

But in these pre-Socratic writings we do not find explicit reference to the word 'energy'; the first usage doesn't appear until the work of Aristotle. The Greek word he used was *energeia*, composed of two roots, *en-* ('at') and *ergon* ('work', or 'deed'). Energy may thus be defined as the capacity or ability to do work. Aristotle used the term to mean, generally, 'activity' or 'power of action'.

This definition, however, begs a question: what is 'work'? Work in the ancient, folk sense means simply, 'something done', 'some change effected'. Change, in turn, requires *movement*, displacement. This is our common sense notion — physical, manual work always involves moving something. This gets back to my original depiction of the Greek cosmos as consisting of 'things that move' — movement being activity, *energeia*, energy.

Thus, the philosophy of energy was, at the beginning, a philosophy of movement. The critical issue for the early philosophers was: does a particular moving object or substance *move itself* (i.e. self-generating), or is it moved by something else? Self-moving objects to Plato were alive, and endowed with a soul. Guthrie, speaking on the Platonic concept of soul, states that it is "the self-moving principle which imparts its own motion to otherwise inert body, thus making it animate." (1962-81, vol. 4, p. 420) In Plato's own words:

> "[W]hen an object moves itself, [we are] to say that it is 'alive'... [W]hen we see that a thing has a soul, the situation is exactly the same... We have to admit that it is alive." (Laws X, 895c)

> "[T]he definition of the thing we call soul [is] 'motion capable of moving itself'." (Laws X, 896a)

> "[S]oul, by virtue of its own motions, stirs into movement everything in the heavens and on earth and in the sea." (Laws X, 896c)

So for Plato, *'soul' is the cosmic principle of motion*, of energy, that drives all movement within the universe. Human beings, of course, have long been believed to be 'energized', animated, by some presence that was called 'soul'; Plato and other philosophers extended this concept to everything that moved — fire, wind, the oceans, the stars and planets, the cosmos as a whole.

Aristotle held to a much more limited conception of soul. Only certain things possessed a soul, including the Prime Mover of the cosmos, certain celestial bodies (surprisingly enough), and self-moving organisms (the things that we today call 'alive'). People and animals had souls, but so too did plants: "It seems also that the principle found in plants is also a kind of soul;" (*De Anima*, 411b27) — Aristotle saw the life processes of plants as being sufficiently similar to those of animals to consider them likewise ensouled. All other physical and cosmic motion was driven, ultimately, by the primordial "unmoved mover", God. Aquinas would eventually adopt this Aristotelian view. He conceived of force, or energy, as deriving from the inexhaustible source of God, and acting independently upon things that moved.

Shortly after the death of Aristotle, the Stoic philosophers saw the need for a cosmological force that would hold the four elements together. They developed a system of philosophy in which an energetic substance, the *pneuma*, sustained and permeated all things. *Pneuma* was an intimate combination of the two active elements, fire and air. The term itself recalls Anaximenes' concept of 'air as spirit', and in fact it means something like 'breath', 'soul', or 'life'. *Pneuma* pervaded all parts of the cosmos; it bound things together into coherent wholes, and it accounted for all the various properties of things. Similar to Heraclitus, it was described as a 'creative fire', a *pyr technicon*, which creates and sustains form. Most importantly, it embodied the 'life energy' of matter, and endowed all things with a degree of spirit. Stoicism was the most well-developed philosophy of energy in the ancient world, and I will elaborate on this subject – especially the panpsychist vision – in Chapter 5.

The concept of energy underwent very little change for several centuries, until it began to take on its modern, physical meaning in the early 17th century. Galileo and Simon Stevin shifted the focus back to 'work', and they were the first to describe it precisely in terms of *force*. Clearly, in order to get something to move, we must apply a *force* to it. This raises a question as to the nature of force. The modern dictionary definition is "an agency or influence, which when applied to a body, results in an acceleration [i.e. movement] of that body". In other words, 'force' is that which causes motion. For Plato, soul was the one and only force; it was the *original* force. Galileo and Stevin were not concerned with what originated movement. They accepted force as any push, pressure, or impact that got something to move. Thus, if I push (lift) a heavy object up into the air, I am doing 'work'. The longer I apply a force, the farther the object travels, and the more work I do. They therefore defined 'work' as 'force times distance'. This is equivalent to our modern equation: $W = F * D$.

Into the 1600's, there emerged a debate between Descartes and Leibniz as to the proper definition of the energy of a moving object[6]. Descartes defined it as 'mass times velocity' (mv), which we today call *momentum*. Leibniz called it the *vis viva* ('life force'), and defined it as 'mass times the *square* of velocity' (mv^2) — essentially identical to our modern definition of *kinetic energy* (we now add a factor of '½').

Bernoulli introduced the word 'energy' into the scientific literature in the early 1700's, and this set off a 150-year confusion about the usage of the terms work, force, and energy. Part of the reason for this was technological: prior to 1800, there simply were no mechanical devices or inventions that stored or transformed energy. Watt's steam engine, and the invention of electrical motors and generators, began a more intense interest in the concept of energy itself, and the need arose to distinguish it clearly from 'work' and 'force'.

The influence of Descartes and especially Leibniz was considerable, and schools of philosophy began to emerge that were centered on the concepts of force and energy. The first of these was *dynamism*. Its chief adherent was Boscovich, who as we saw developed the position that force (again, not clearly distinguished from 'energy') was the fundamental ontological reality: mind and matter were really just various manifestations of force. This was a major advance, because here, for the first time in the modern era, a theory of energy had replaced and superseded a philosophy of matter. In other words, we now had a theory of matter that was *immaterial*. Energy had assumed a "new ontological status", superior to that of matter. Nietzsche was evidently impressed; he called the dynamist theory of Boscovich "the greatest triumph over the senses that has been gained on earth so far" (1886: 20).

Priestley (1733-1804) held a similar view, but he went further metaphysically, arguing for a panpsychist account of matter by equating matter and mind. Like Priestly, Herder (1745-1803) and Schelling (1775-1854) developed dynamist views of reality in conjunction with panpsychist theories of mind — further details on these individuals later.

In the late 1700's, Carnot argued that 'energy' could be represented *either* as $\frac{1}{2}mv^2$ or F*D. This was an important advance, because it finally, and correctly, linked the three concepts of energy, work, and force. In particular, Carnot showed that 'work' and 'energy' were really the same thing, measurable in identical terms. A simple example will illustrate this. Consider a metal spring, one end fixed, lying on a frictionless table. We can compress the spring by applying a constant force 'F' to the free end; this will cause it to compress some distance 'D', where it will stop (when the counter-force of the spring equals our applied force). Latch the spring. In applying this force F over a distance d, we have done work W = FD.

Now place some small mass 'm' at the free end of the spring, and release it. The 'energy' measured by the 'FD', stored as *potential* energy in the spring, is now converted into *kinetic* (i.e. 'actual') energy of the mass. Neglecting frictional losses, the mass will be accelerated (by the force of the spring), and will reach a velocity 'v' such that

$$\text{kinetic energy} = \text{work},$$

$$\text{So:} \qquad \tfrac{1}{2} mv^2 = FD,$$

$$\text{Or:} \qquad v = \sqrt{(2FD/m)}$$

The fact that 'work' and 'energy' are the same thing is reflected in the units of measurement — both are measured in *joules*. One joule of work is roughly that required to lift a one kilogram mass by 10 cm.

By the early 1800's it was becoming clear that energy applied not only to moving objects, but to other natural processes that had the ability to produce motion. The ability of living organisms to move was seen as residing somehow in the 'energy' of the food they ate; we recognize this now as chemical energy. Electric and magnetic 'fields' were known to attract or repel objects, and thus the fields themselves must somehow embody energy. The phenomenon of heat was seen as a kind of motion. Gravity was clearly able to move things. It began to dawn on some thinkers that, everywhere they looked, they saw not so much raw 'force' as energy — that perhaps even all of nature was, in essence, energy. In 1799, Schelling exclaimed that "magnetic, electrical, chemical, and finally even organic phenomena would be interwoven into one great association...[which] extends over the whole of nature."[7].

In the mid- to late-1800's, as the study of the concept of 'fields' advanced, it was possible to envision energy with no material substrate at all. It became apparent to people such as Maxwell and James Croll that energy could exist in 'empty space', embodied in fields that permeated even a vacuum. In particular, energy could exist and move without any obvious presence of force; thus it came to be regarded as a more fundamental reality. To conceive of energy present even in empty space was a large conceptual and philosophical leap; 'non-material energy' sounded irrational, heretical, even mystical. Yet it could not be denied. Maxwell's wave equations were unquestionably confirmed.

Continuing in the line of thought originated by dynamism, some philosophers thus began to argue that not force but energy was the primordial basis of all reality. This was the doctrine of 'energeticism', and was advocated in various forms, beginning in an early form with Spencer (1820-1903), and further developed by Maxwell (1831-1879), Mach (1838-1916), and Ostwald (1853-1932)[8]. They all held that natural phenomena were simply different manifestations and transformations of energy, which was the basic physical reality. Their case was bolstered by advances in science, and especially in electromagnetic theory, where it became increasingly clear that electric and magnetic energy existed and could travel through space at exceedingly high speeds.

Energeticism found its consummation and ultimate articulation in Einstein's theory of relativity, in which he formulated the famous equation $E=mc^2$, showing that matter and energy were, in fact, fundamentally equivalent. The concept of a single entity, *mass-energy*, resolved much of the tension between competing theories of matter and the theories of energy, unifying the two concepts in larger, transcendent framework. Philosophers of science still, however, maintained an energeticist inclination, opting to view energy as the more dominant and fundamental mode of existence, rather than mass. This was clearly Einstein's view:

> Matter which we perceive is merely nothing but a great concentration of energy in very small regions. We may therefore regard matter as being constituted by the regions of space in which the field is extremely intense...

> There is no place in this new kind of physics both for the field and matter for field [i.e. energy] is the only reality. (cited in Capek, 1961: 319)

Russell stated the same idea in 1948, when he claimed that "it is energy, not matter, that is fundamental in physics" (1948: 291). Heisenberg held the same opinion — see his (1958: 61, 67). More recently Popper reiterated this view; "matter turns out to be highly packed energy" (Popper and Eccles, 1977: 7).

Over the course of the 20th century, modern physicists gradually developed our present conception of energy. Einstein had showed that mass, in itself, was energy. Physicists also knew that electromagnetic waves carried energy, and they knew that gravity was a source of energy. Both of these were kinds of physical force. Research into particle physics and the use of particle-accelerators uncovered two other kinds of force, both operating at the atomic level: the 'strong' and 'weak' nuclear forces. Thus emerged the theory of the 'four fundamental forces' of nature, a theory that holds today.

The fundamental forces share a number of characteristics. One, they exist as a 'field', that is, as producing a certain force (or, more generally, 'action'[9]) in the surrounding space. Two, the forces are manifest by *the exchange of particles*; each force has its own associated particle that acts as the carrier of that force (see below). Three, each force is non-linear with respect to distance from its source. In addition, the two forces responsible for all large-scale phenomena — gravity and electromagnetic — have the property of decreasing in strength as distance increases, asymptotically approaching, but *never reaching*, zero. This fact is important in the larger conception of the Partimater.

To summarize: In the current theory, energy exists in two basic forms: 'mass' (i.e. rest mass), and 'force':

1) Mass — the energy in a quantity of rest mass (m) is = mc^2

2) Force — 4 fundamental forces, each carried by a particular 'force particle':

(a) electromagnetic - transmitted by the 'photon'

(b) gravity - transmitted by the 'graviton'

(c) strong - transmitted by the 'gluon'

(d) weak - transmitted by the 'intermediate vector boson'

So, our modern mass-energy picture of physical reality is *entirely particle-based*: two particles of mass (leptons and quarks), and four particles of force — six total. These six types of particles account for the *whole of materialist reality*. Leucippus and Democritus stand vindicated. Furthermore, the mass particles have the potential of being converted entirely into energy, via collision with each one's anti-particle. In this view — that of Einstein and Russell, among others — we really have just particles of energy; a fulfillment of the energeticist dream.

Around the turn of the century, three other significant developments emerged. I mention these only in passing now, but I will return to them later. First: A new concept came into being which added further complications to the mass-energy worldview, and this was the *quantum*. Energy was packaged not in arbitrary units, but as multiples of a small base unit. Atoms which changed energy levels did so not smoothly and continuously, but in discrete jumps. Furthermore, particles obeying quantum mechanics exhibited strange new properties, that were statistical, unintuitive, and even paradoxical in nature.

Second: As it happened, certain philosophers of science were unhappy with the quantum mechanical, mass-energy picture. Even as the relativistic concepts were emerging, people like William Kingdom Clifford were proposing alternative theories of reality. Clifford put forth the notion that particles of mass were in essence 'wrinkles', or in his words, "hills", of space-time itself. This theory was taken up in the 1960's by Wheeler, in his concept known as 'geometrodynamics'.

Third: Another new approach had opened up in the late 1800's, and this was due to Bergson. He saw *time* as an essential feature of reality, and developed philosophical implications from the new concept of space-time. For Bergson, the classical picture of inert matter sitting 'in space' and 'in time' was fundamentally flawed. With the unity of space and time into space-time, it became clear to him that matter could never be independent of time. Matter must have a 'temporal nature' at root. And, the persistence of matter could be explained only by presuming an element of *memory* within matter; somehow, information from the immediate past had to be carried over to the unfolding of the future, otherwise persistence and unity over time would be impossible. Bergson's insights were supported by advances in physics: de Broglie discovered the 'oscillatory' description of matter, and Heisenberg's "uncertainty principle" showed, in its alternative formulation, that energy and time were inextricably linked.

Bergson's ideas were endorsed by James, and taken up by Whitehead (and later Bohm), who developed what is now referred to as 'process philosophy'. This view sees neither mass nor energy as fundamental, but rather something called an "event". Reality and the persistence of matter are seen as an unending series of events in space-time, involving energy but not consisting of energy. Events are thus seen as the true realities, and, as Capek states bluntly, "particles and motions *do not exist*" (1961: 391). So much for the idea of 'things that move'.

Here, I will adopt essentially an energeticist view *with respect to the physical world.* I take energy as the fundamental material substance, but with the provision that energy only represents one of two (at least) aspects of a total monistic reality. 'Particles' I take as intense, quasi-stable concentrations of energy. Furthermore, in the post-Newtonian era it is easier to disregard the classical notion of particle than it is of 'motion'; motion seems to be essential to the process of exchange and participation. And motion, of course, necessarily involves a concept of time, so the distance between a strict 'process' view of reality and modern energeticist/physicalist view is perhaps not so great as Capek suggests.

NOTES:

[1] Cf. Mautner (1996: 198), or Laurita (1989: 79).

[2] This makes Anaxagoras a metaphysical idealist, though not the first; Parmenides held that Being was identical to Mind -- ref Chapter 1.

[3] The later atomist Epicurus (342-270 BCE) is generally attributed with popularizing the idea of atoms 'falling through the void'.

[4] Five, if we count 'the aether' of the heavens.

[5] Cf. Laws, X, 898d; and also see my later discussion.

[6] They used the term 'force', which only adds to the confusion, but from the context it is clear that they are referring to the concept of energy.

[7] From Schelling's work, *Einleitung zum Entwerf eines Systems der Naturphilosophie* (1799), cited in Jammer (1972: 514).

[8] Rankine and Helm also played a role in the development of energeticism.

[9] In particular, the weak force is not really a force in the classical sense. Rather, it only affects decay rates of atomic particles. This contrasts to the traditional action of a force as producing an acceleration of some mass.

Chapter 3 - Chaos and the Complexity of the World

1) Background on Chaos

Chaos theory is a prime example of that rarest of scientific events -- the emergence of something new in a *new sense*. Here we have a breakthrough idea that changes no existing scientific laws, and introduces no new fundamental hypotheses or theories about the world. And yet it is an entirely new approach to physical systems, and to our understanding of them. It permits completely novel interpretations of old data; it expresses new and deeper meaning to terms such as 'random', 'pattern', and 'predictable'; and it clears the way for new articulations about the nature of the human and the cosmos. So profound and far-reaching is its influence that it has been ranked with relativity and quantum mechanics as the most important and lasting scientific advances of the 20th century.

And like relativity and quantum mechanics, it has implications that reach beyond the bounds of the physical sciences. Chaos theory has direct bearing on a number of fields of inquiry, including areas as diverse as economics, social theory, and music theory. Chaotic effects are found in innumerable everyday events, such as the dripping of a faucet, the waving of a flag in the breeze, the patterns of weather, and the activity within the human brain. Importantly, it also addresses issues of philosophical significance, such as determinism and free will, ontological theories of matter and structure, and the nature of evolution in the general sense. Most importantly, it proves very useful in furthering our knowledge and descriptions of the mind, the brain, and their interrelationship.

Chaos theory is part of the larger area of study known as 'dynamical systems theory', which seeks to understand how well-defined systems of mass and energy change over time. It is also a core element of the emerging discipline called 'complexity theory', which incorporates a host of new techniques for studying complicated or unpredictable systems. Chaos theory is rooted in mathematics, so the following discussion will necessarily be of a more mathematical nature. But I hope to show in a non-technical manner something of its deeper philosophical significance.

Finally, let me note a very important point regarding my application of chaos theory to systems of mind. Formally speaking, chaos theory applies only to mathematical models of closed systems. However, the general concepts and principles can be meaningfully applied to real-life situations – including systems that are open to energy exchanges with their surroundings. Here I will be applying the *concepts* rather than a formal analysis.

* * * * * *

The term 'chaos' as used in my context clearly has a specialized meaning, only loosely related to the common sense meaning of 'utter confusion or disorder wholly without organization'. This folk meaning comes from the ancient sense of chaos; in Greek times the word was *khaos,* meaning a void or chasm. The poet Hesiod, writing some 200 years before Plato, described *khaos* as the primordial void that gave birth to the universe: "First of all came the Chasm (*khaos*), and then wide-bosomed Earth ..."[1]. In the primordial void, all is unknown; all is random, frenetic disorder. But the new sense of chaos is not a concept of emptiness or unknowing. In fact, chaos today refers specifically to a *unique kind of order*: an order within apparent disorder.

In the simplest terms, chaos is the existence of complicated and unpredictable behavior arising from non-random processes, even very simple ones. It had long been assumed that the only way to model complex physical systems was to use complex equations. Simple equations gave simple, predictable results, and complex equations gave complex results. Complex phenomena of the real world required, therefore, complex descriptions and complex models.

Chaos theory suggests a reversal of this conception. Simple equations can yield very complicated results, and apparently complicated phenomena may be describable, in their essence, with relatively simple models and equations. In other words, *chaos is a method of simplification that allows greater comprehension.*

I begin by looking at the basic mathematics of chaos theory. This semi-formal introduction will serve to explain the concepts I am using. Again, they apply, strictly speaking, only to models of closed systems. But the concepts are useful in examining a wide range of real physical systems.

A mathematical model is describable in terms of mathematical equations. Typically these equations would be either *differential* (for a continuously dynamic model) or *discrete* (for a model that move step-wise through time). Here I consider primarily discrete equations, as these more simply explain the basic concepts involved.

The textbook explanation of chaos theory states that a model requires three characteristics to allow the conditions for chaos: the model must be (1) deterministic, (2) nonlinear, and (3) exhibiting feedback. I will start with a brief examination of each of these.

A *deterministic system* is one that changes with time according to a set of equations (based in laws of science) that have no element of inherent randomness or chance. The equations involve 'ordinary' variables and operations, with no random numbers or other elements. For example, the laws of physics – including, significantly, the wave equation describing quantum particles[2] – are described with deterministic equations. Newton's laws of motion are all deterministic, as are the more accurate relativistic versions of them. Equations like

d = rt [distance = rate x time], or

F = ma [force = mass x acceleration]

all involve discrete, well-defined quantities, the consequences of which follow by simple calculation.

The opposite of a deterministic system is a *stochastic* system, one that appeals to random events or variables, like the outcome of a coin toss. It is easy to get random-like results when one inserts random variables into a system; deterministic systems, lacking these, were always thought to produce totally predictable outcomes. This is not to imply that stochastic systems cannot display chaos-like behavior; rather, we simply are lacking any well-formulated conception of what 'stochastic chaos' would be.

It is interesting to note that many complex physical processes appear to have elements of randomness. When scientists have sought to describe such systems they often used stochastic models to account for the randomness. But there is an element of fallacy here, and it is based on the need for pragmatism and expedience. Since the laws of physics are deterministic, there is theoretically no need to introduce randomness, other than as a matter of convenience or abbreviation.

Traditionally, deterministic systems are seen to exhibit certain specific properties. One of these is *predictability.* Knowing the current state of any system, and the laws of the forces acting on that system, one was thought to be able, in principle, to calculate the future evolution of the system to an arbitrarily fine degree of accuracy. Laplace is famous for his description of a super-intellect, perhaps God, who, if knowing the current state of all particles in the universe, would therefore know the entire history of the universe, past and present. A related property of deterministic systems is the uniqueness of past and future: at any given time, there occurred only one possible past, and there will be only one possible future. Chaos theory seriously undermines this naïve notion of predictability and replaces it with a more complex and subtle conception: one of predictability in a broad, qualitative sense.

The second characteristic is *nonlinearity.* This refers specifically to the equations that govern a physical system. An equation is nonlinear if any one of the variables in it has an exponent that is not equal to one; a simple example would be $T = 2x^2 + 4y^3 - 7z^{0.3}$. Nonlinear equations may also include the 'transcendental' functions, like sin(x), or e^x. The two equations I noted earlier are linear with respect to each variable on the right-hand side -- there is no power of 2 or 3, a square root, a '1/x', or a sin(x) term.

The formula for the area of a circle, $A=\pi r^2$, is nonlinear with respect to the radius. Some of Newton's laws of motion are nonlinear: $d=1/2\ a\ t^2$, so the distance traveled by an accelerating object is nonlinear with respect to time. The force due to gravity is nonlinear with respect to the distance between the objects: for example, if a ball of mass 'm' is a distance R from the center of a planet of mass 'M', then the force on the ball (and, symmetrically, the force on the planet!) is given by

$$F = GmM/R^2$$

where 'G' is the "universal gravitational constant". We say that the gravitational force is 'inverse-square' with respect to distance. The force of gravity, as we know, is one of the four so-called fundamental forces of the universe[3]; the other three are the electromagnetic, the strong nuclear, and the weak nuclear. Importantly, *all four of the fundamental forces, and therefore all forces in the universe, are nonlinear with respect to distance*. The electromagnetic force has the same form as gravity. The strong nuclear has both 'inverse square' and 'inverse' terms with respect to distance. The weak nuclear is not concisely formulated, but it is known to be strongly nonlinear. This nonlinearity of all force is a necessary precondition for the occurrence of chaos in natural systems.

The third essential characteristic is *feedback*. Feedback is a feature of a system in which the forces or effects of a given object pass through some chain of events and circle back to affect the object itself. A common example of feedback occurs in the audio system of an auditorium: some small noise in an amplifier is played through loudspeakers, picked up by a microphone, amplified a little louder, picked up again, and so on, until only a high-pitch squeal can be heard. Another example is the echo-location system of bats: their brain determines that they need to identify things ahead of them, so it signals the voice box to emit a high frequency sound, which bounces off an object in front, feeds back to their ears/brain, and then the bat takes the appropriate course of action. All living systems respond to their environment in a real-time manner that requires feedback.

Feedback is typically described as either 'negative' or 'positive'. Negative feedback leads to a diminution of the 'error signal', and thus is useful for control systems; positive feedback results in an amplification of error, leading to often rapid growth of the signal strength (as with the auditorium example). This idea of feedback being either positive or negative is, however, more relevant for artificial systems than natural ones. More generally, it is simply a continual input of information (energy) from the body or the environment, based on the changing conditions.

In a system of equations, feedback refers to the output of an equation affecting the input of one or more equations. This is typically done by the process called 'iteration', in which the output of an equation is then used as the input to that same equation for the next calculation. The process is repeated a number of times, always feeding the output back as input. Iteration is the mathematical analog of feedback. The following example will clarify.

Chaos is a nearly universal, or potentially universal, property of nonlinear systems and their underlying equations. As such, it can appear in even very simple cases. The most well-known example is the 'logistic equation', which is instructive because it demonstrates the three essential aspects of chaos. Consider the equation $f(x) = c\,(x - x^2)$, where 'c' is a constant. The equation is deterministic, as there are no strange random variables in it. It is nonlinear, due to the x^2 term. We induce feedback via iteration, as follows. Take some initial value of x between 0 and 1, call it x_o. Calculate the 'output' value $f(x_o)$. Use this as the new value of x, call it x_1. Calculate the next output $f(x_1)$. Repeat the process indefinitely. You will have calculated a sequence of numbers: $x_o, x_1, x_2, x_3, \ldots$

Depending on the value of 'c' that you use, you will get vastly different results. In general, three different sorts of behavior can arise. One, the sequence will start at, say, 0.1, bounce around a bit, and then settle down quickly to a single value – the 'solution' – from which it will not move. Interestingly, no matter where you start with your x_o, the sequence will converge to the same solution. Thus, the solution point acts as an 'attractor' to all initial values of x. Since the solution point is a fixed (i.e. single) point, this case is called a 'fixed point attractor'.

In the logistic equation, you will get a fixed point attractor for any 'c' such that $0 < c < 3$. Different values of 'c' will yield different solution points. As a specific example, if we take $c = 2$ and $x_o = 0.1$, the values will progress as follows:

$x_o = 0.1$

$x_1 = 0.18$

$x_2 = 0.295$

$x_3 = 0.416$

$x_4 = 0.486$

$x_5 = 0.499$

$x_6 = 0.5$

$x_7 = 0.5 \ldots$

at which point the sequence is fixed at 0.5. This sequence is easily confirmed on any spreadsheet or pocket calculator. A somewhat more interesting case occurs when c = 2.8. Here, the fixed point attractor has a value x = 0.64285... The graph shown in Fig. 1 shows how the points of the sequence are drawn to the fixed point solution.

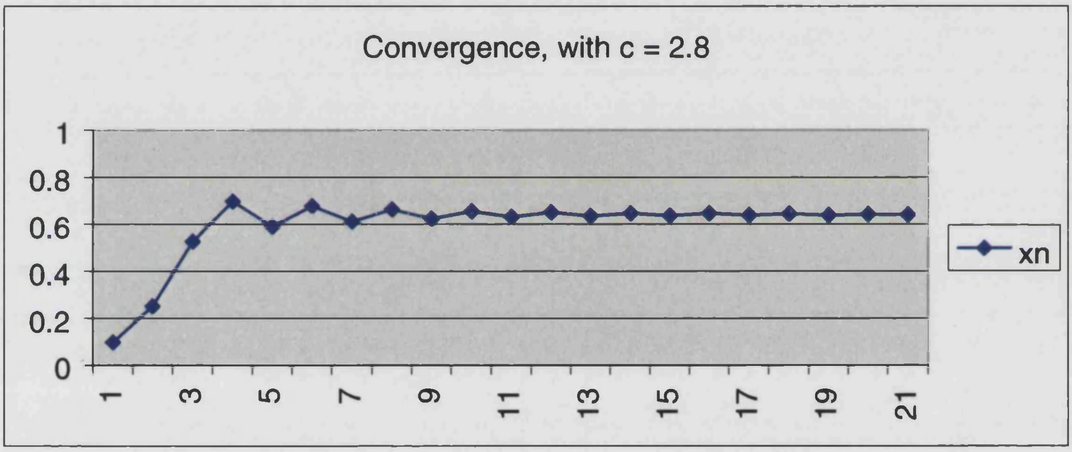

Figure 1 – Convergence of the logistic equation (c = 2.8)

In the second type of general behavior, called a 'limit cycle', the sequence settles in not on a single value, but instead oscillates between two or more values. In our example, this happens when 'c' crosses the threshold value of 3. Figure 2 shows this behavior for c = 3.2. Thus, the pair of points (0.799, 0.513) acts as the attractor.

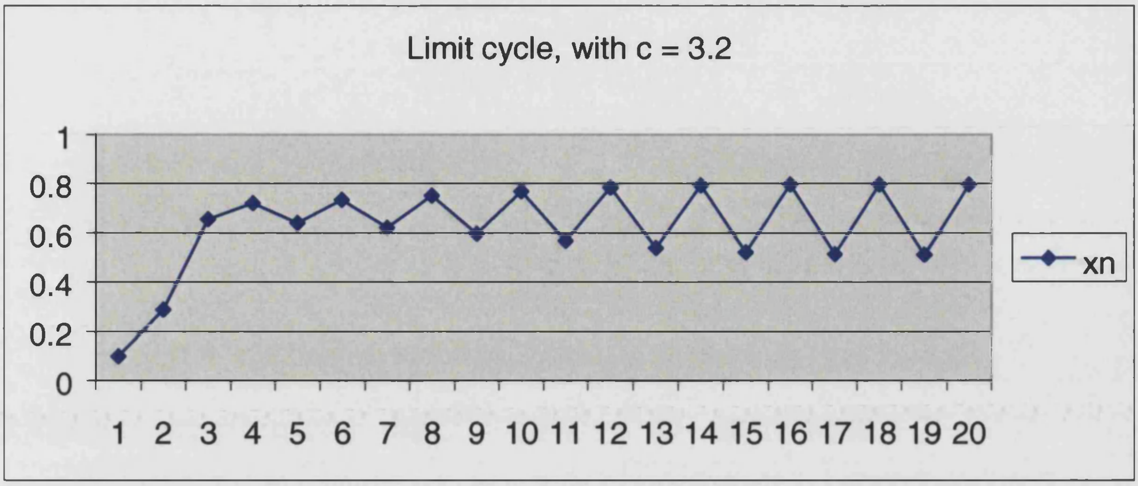

Figure 2 – Period 2 limit cycle (c = 3.2)

The limit cycle of two points only holds for a small range of ‘c’. If we increase it further, we find that as we cross the threshold c = 3.4495 we get a 4-point attractor. Taking c = 3.5, for example, gives the results shown in Fig. 3. As we further increase ‘c’, we get successive thresholds, closer and closer together, each of which cause a *doubling* of the number of attractor points.

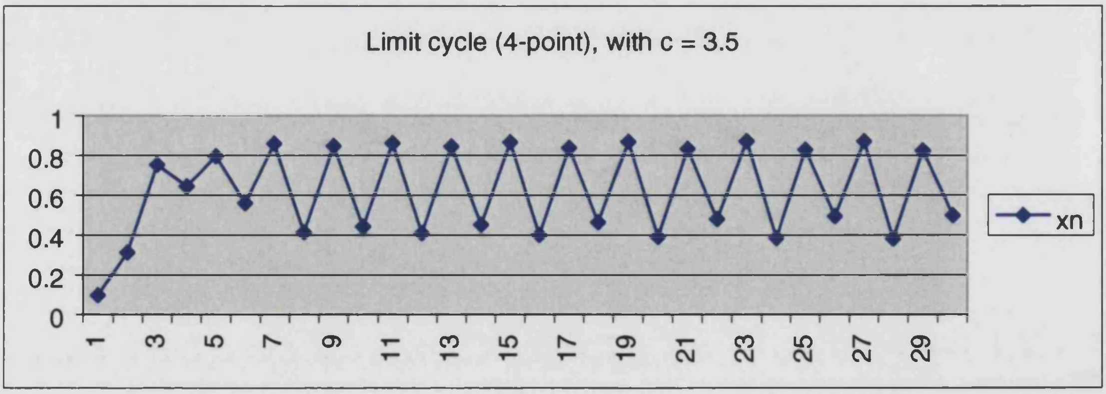

Figure 3 – Period 4 limit cycle (c = 3.5)

Then, we reach a critical value of ‘c’ (here, c_{crit} = 3.5699...), in which we get, literally, an infinite number of attractor points[4]. This is the third type of behavior -- chaos. Of course, nothing in the equations stops us from using a c-value equal or greater than this critical number. What happens is that the sequence values spend ‘forever’ bouncing from point to point on this infinitely large attractor, never (in theory) repeating themselves. This infinitely large attractor, being rather strange, is appropriately known as a "strange attractor"[5].

Figure 4 shows the sequence for a value of c = 3.58, just into the chaotic region; I will call this 'shallow chaos'. Every value is unique, and the long-term behavior is technically unpredictable -- if one wanted to know the value (to the same order of precision) at step #1000, there is no procedure for determining it other than to literally calculate every value up to 1000.

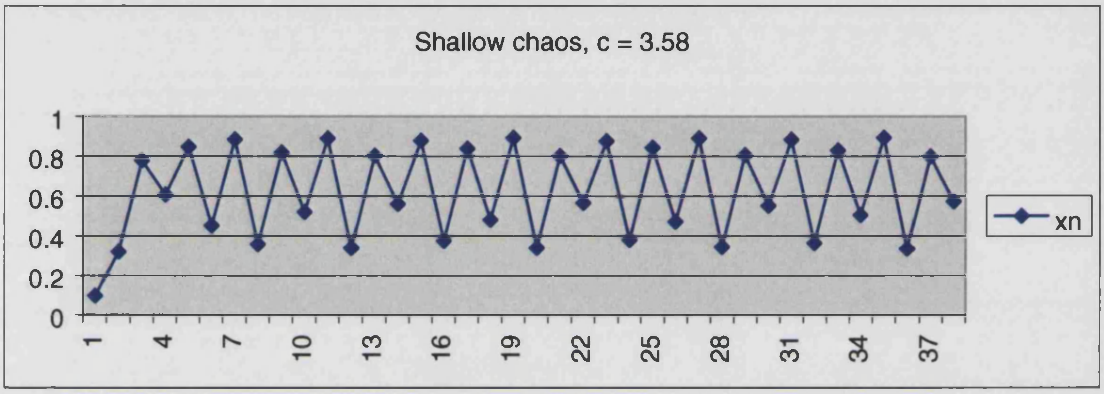

Figure 4 – 'Shallow' chaos (c = 3.58)

And yet, we see that there is some pattern to this chaos. We see that the points are scattered, yet bounded: they tend to fall between 0.3 and 0.6, and between 0.8 and 0.9. Also, successive points will alternate between the lower band and the upper band, i.e. all odd steps are in the lower and all even steps are in the upper. So, we can say *something* about, for example, step #1000: it will lie in the upper band, and have a value between 0.8 and 0.9. Is this a prediction? Not in the traditional scientific sense, which assumes that any quantity can be calculated to an arbitrarily high degree of precision. But clearly it has some useful value. *It is more of a qualitative prediction than a quantitative prediction.* This is a trademark of chaos. And it indicates something of the flavor in which chaos can be used to explore what Goodwin calls the "science of qualities" – see Goodwin (1994, 1999a, 1999b) or Reason and Goodwin (1999).

We can press further into the chaotic region. Take c = 3.92. Call this 'deep chaos'. Here is true disorder -- see Fig. 5. The values are well-distributed between 0 and 1. No pattern or 'banding' appears. Consecutive points may be very close or very distant. We can make virtually no prediction about the value at step #1000. This behavior tells us more about the structure of the equation, i.e. the value of 'c', than anything else.

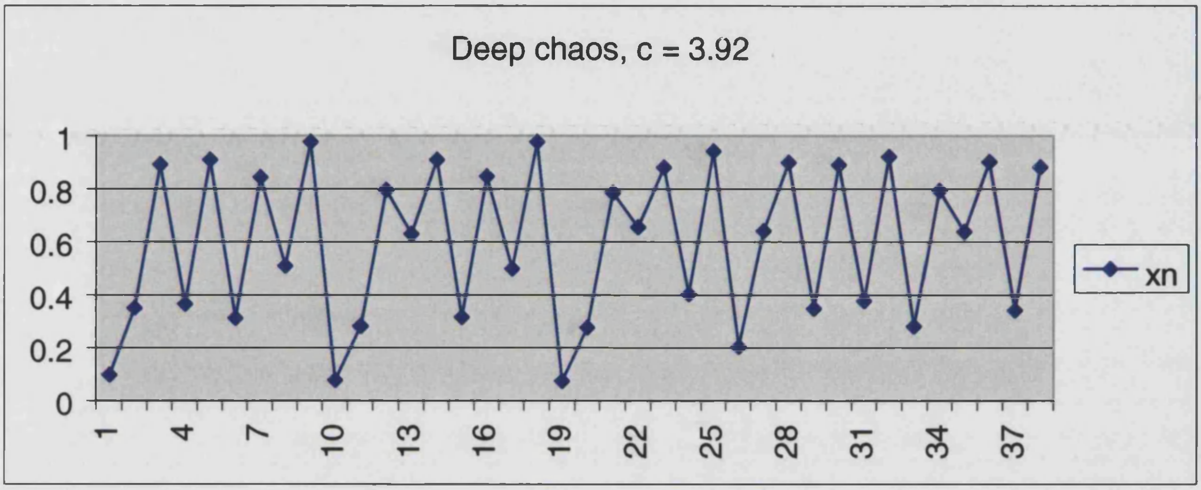

Figure 5 – 'Deep' chaos (c = 3.92)

There is one important bit of order that emerges from this deep chaos. It is usually possible to recreate the 'original conditions' of the system from the data themselves. Consider if the points in the sequence were not calculated, but were obtained by some empirical measurement -- say, percentage humidity on consecutive days, or the time interval between drips of a faucet. A group of researchers at UC-Santa Cruz[6] discovered a clever way to depict the underlying pattern, the essence of the strange attractor. They simply plotted consecutive points on an x-y graph. So we can plot the sequence of points (x_o, x_1), (x_1, x_2), (x_2, x_3), ... We see the results in Fig. 6 – an inverted parabola. In this case, of course, the plot was predictable, since the logistic equation itself is just this parabola. But even when lacking such *a priori* information, we do have techniques for uncovering patterns in chaos.

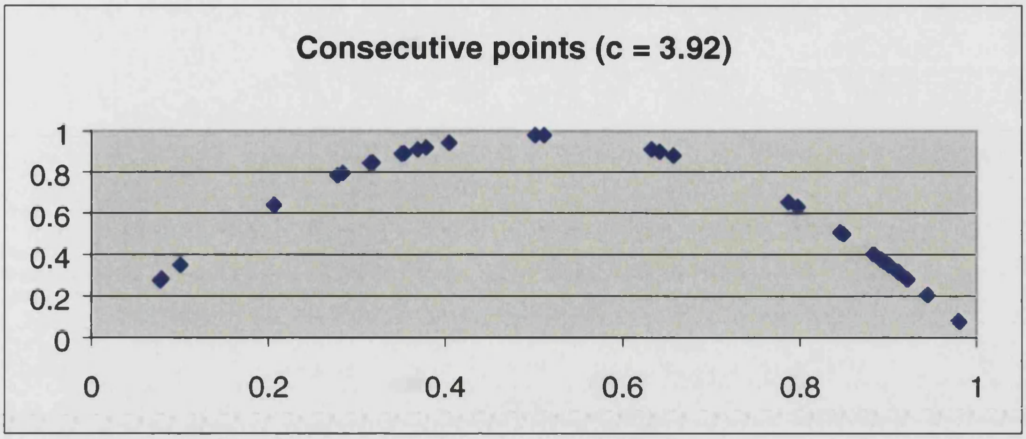

Figure 6 – Characterizing a chaotic system, based on empirical data

2) History of Chaos Theory

Mathematics aside, I want to take a moment to look at how chaos theory evolved. Traditionally chaos theory is considered to originate in the work of the French physicist, mathematician, and philosopher, Henri Poincare (1854-1912). However, some of the key ideas were anticipated earlier by the American mathematician and philosopher Charles Sanders Peirce (1839-1914). Peirce was aware of the importance of nonlinearity in natural systems, and that this fact may have significant consequences. In an important 1892 article, "Man's Glassy Essence", Peirce examines the nature of life and the phenomenon of sensitivity or awareness in living systems. He observes a fundamental tenet of chaos theory: that almost imperceptibly small influences can have large effects in a suitably dynamic system, like a living cell:

> If, then, we suppose that matter never does obey its ideal laws with absolute precision, but that there are almost insensible fortuitous departures from regularity, these will produce, in general, equally minute effects. But protoplasm is in an excessively unstable condition; and it is the characteristic of unstable equilibrium, that near that point excessively minute changes may produce startling large effects. (1892: 18)

This insightful passage anticipates not only the central point of chaos theory, but also the notion of a living system as an 'excitable medium' (see Goodwin, 1994), and as situated in an 'edge-of-chaos' condition (see Kaufmann, 1995). And it predates the more well-known passage by Poincare, cited below, by 16 years.

Poincare had strong intuitive feelings about the nature of the physical world, and these led him to anticipate a number of developments that would occur later in the 20th century. His philosophy of 'conventionalism' presaged concepts in relativity theory. He had a feel for the interconnectedness of the cosmos; in 1902 he wrote, "[N]o system exists which is abstracted from all external action; every part of the universe is subject, more or less, to the action of the other parts." (1902: 103). He made extensive use of dynamical systems theory, which, as we will see, is crucial for understanding chaos.

Importantly, Poincare's work on resolving the '3-body problem' led him to insights on the nature of nonlinear systems. This problem refers to predicting the movement through space of three mutually-gravitating objects, like a planet with two moons. Newton's equations of gravitational force are easily solved for two bodies, and there was no inherent reason to expect issues with three bodies. As it turns out, the problem is very difficult, and in most cases has no analytic solution. If one were to attempt an actual physical experiment, one must take measurements. Any physical measurement inevitably has a small amount of error or uncertainty. The reigning sensibilities claimed that 'small errors in measurement yield small errors in prediction'. Poincare understood that in a dynamic, nonlinear system, this was simply not true. Even assuming perfect knowledge of physical laws,

> we could still only know the initial situation *approximately*. If that enabled us to predict the succeeding situation *with the same approximation*, that is all we require, and we should say that the phenomenon had been predicted... But it is not always so; it may happen that small differences in the initial conditions produce very great ones in the final phenomena. A small error in the former will produce an enor-mous error in the latter. Prediction becomes impossible... (1908: 67-8)

Here we have the second early and succinct description of the phenomenon that we call chaos. I will demonstrate this susceptibility to error shortly.

In spite of these two remarkable insights and hints of complexity residing in simple dynamical systems, it took more than 50 years before the scientific community grasped the importance. In the early 1960's, MIT researcher Edward Lorenz recorded the first known instance of chaos. He was using a simple computer model to study conditions related to the Earth's climate. The model addressed the interrelationship of three nonlinear factors in convective flow (as in a liquid) under conditions of a temperature gradient. Lorenz's model was a system of three nonlinear equations that he found to be extraordinarily sensitive to 'error' in the initial conditions. He ran the model with one set of input values, got a prediction, and then compared it to the prediction arising from a very small change in one of the input values. Like most scientists, Lorenz expected to see nearly identical predictions. Instead he found exponentially increasing variation between the two. After ruling out problems with the computer or the software, Lorenz decided that this type of response was inherent in his model. He published his conclusions in a now-famous paper, "Deterministic, nonperiodic flow" (1963).

At about the same time, French researcher Michel Henon was working on a sophisticated variation of the three-body problem, namely, the movement of stars within globular clusters. Like Lorenz, Henon sought to model the movement of stars on a computer, using a set of nonlinear equations. The model was set up such that the average energy level of the stars was controllable, to account for the difference between dispersed, slow-moving star groups and compact, fast-moving ones. At low energy, the model predicted regular, stable, periodic orbits, as was expected. As the energy level was increased, though, the picture became more complicated. At first, areas of stability mixed with areas of apparent randomness. Then, greater and greater randomness appeared (see Henon and Heiles, 1964, for detailed analysis). Chaos was emerging, dependent upon the level of energy.

The behavior of Henon's system is strongly reminiscent of the logistic equation example, in which chaos emerged as we increased the value of 'c'. In fact, we can interpret 'c' as the *energy level of the logistic equation*, or the 'proliferative drive' of the system. Biologists, when using the logistic equation to model population fluctuations, refer to 'c' as the "intrinsic growth rate" or "net rate of increase" of the given species (see May, 1974, or Rayner, 1997). Such examples as these argue for a deep connection between chaos and energy.

The next decade began a series of milestones in chaos theory, occurring almost annually. In 1971, two mathematicians, David Ruelle of Belgium and Floris Takens of the Netherlands published a paper, "On the Nature of Turbulence" (Ruelle and Takens, 1971), in which they coined the term "strange attractor". In 1974, Princeton biologist Robert May published the first analysis of chaos in the logistic equation, and introduced the term 'chaos' (attributed to mathematician James Yorke) for the first time; his paper was "Biological Populations with Non-overlapping Generations: Stable Points, Stable Cycles, and Chaos" (May, 1974). Yorke published his own paper on chaos shortly thereafter, "Period Three Implies Chaos" (Yorke and Li, 1975). Henon developed his set of equations further, and by 1976 came up with a concise 2-equation system that produced a well-known strange attractor, referred to now as the 'Henon attractor'.

By this time, chaos theory was beginning to attract attention in the wider scientific community. In 1977 the first international conference dedicated to chaos theory was held in Como, Italy. Also in that year, Benoit Mandelbrot published his first book on the study of 'fractals', titled <u>Fractals: Form, Chance and Dimension</u> (1977). Fractal patterns are very complex computer-generated pictures arising from the same type of simple equations that produce chaos; most notable of these patterns is the famous 'Mandlebrot set'. An important advance came in 1978 when Mitchell Fiegenbaum proved that the 'period doubling' pattern found in the logistic equation is not unique to it, and is in fact found in *every* nonlinear system (Fiegenbaum, 1978); this had the effect of showing that chaos was *universal*, and not limited to some small class of equations.

Chaos theory has been further refined in the past 20 years, but without significant revision to the basic theory. The most important developments have been in the applications of chaos theory to various areas of science, psychology, and philosophy. People like Sally Goerner put forth ideas linking chaos to evolution (see her 1994).

Chaos was sought in the movements of the planets (Parker, 1996; Frank, 1998) – with results that I discuss shortly. The linkage between chaos and mind was examined by some (see for example Kaufmann (1993), Goertzel (1993), Combs (1995), Kelso (1995), or Kelso and Fuchs (1995)), and this anticipated some of my ideas, as I will explain. And such philosophers as Peter Smith (1998) spelled out in great detail some of the philosophical significance of chaos theory, including what can and cannot be claimed of it. All these works have expanded and deepened our understanding of the importance of chaos theory.

3) The Concept of Phase Space

We have seen, in some detail, the example of the logistic equation and how it can yield chaotic results under the proper conditions. I now want to examine the method in which we describe real-world dynamical systems. This will introduce the concept of '*phase space*', and it is critical to understanding the nature of chaos.

Every physical system that changes in time can be described mathematically in terms of its 'state variables'. These variables are the quantities that capture the essence of the system. They describe how it changes with time. Most importantly, the state variables embody the *energy dynamics* of the system.

As before, an example offers the best explanation. The standard example is a simple, free-swinging pendulum. Let me note first of all that this example is intended only to describe 'phase space diagrams', not chaos; later examples will consider chaos in phase space. Assume first of all an ideal pendulum, with a bob of mass 'm', arm length of 'L', in a frictionless environment. To describe it mathematically we need to overlay the pendulum on an x-y graph -- see Fig. 7a. The fulcrum is attached at y = L, and the bob swings from a point of maximum displacement, down to the origin (0, 0), over to its opposite peak, and back again.

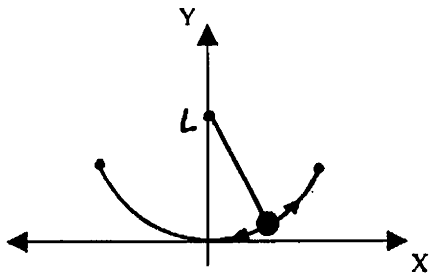

FIGURE 7a – Simple pendulum

We now start the pendulum swinging. To describe its motion mathematically we have at least three options: One, we can note that it swings with a period T (the time required for one round-trip swing), given by the standard formula $T^2 = 4\pi^2 L/g$ (where g = 32 feet/sec^2, the gravitational acceleration of the Earth); this applies only under conditions of 'linearity', i.e. ordinary back-and-forth motion. Two, we can find two equations to describe the x and y coordinates of the bob, in the form $x = f_1(t)$, $y = f_2(t)$. Three, we can create a 'phase space diagram', which is the method of interest here.

The phase space pattern is drawn in a Cartesian grid system, similar to, but different from, the grid on which we sketched the actual pendulum. Since the bob moves in a 2-dimensional plane and is constrained by the lever arm, we need only two state variables to fully describe its motion: its displacement (angle) from the y-axis, 'α', and its velocity (i.e. 'speed') 'v', defined as tangent to the circle in a clockwise direction[7]. Therefore, the phase space diagram can be drawn in 2-D, like a normal x-y coordinate system. The horizontal axis 'α' indicates the displacement, and the vertical axis 'V' indicates the velocity.

As the pendulum swings back and forth, both 'α' and 'v' are continuously changing. At each moment in time we can identify a particular value of position and velocity. These two values are then plotted as a single point on the phase space picture. For a simple frictionless pendulum, this plot will form a circle -- see Fig. 7b. Start the bob at the right-most position, on Fig. 7a. This point has $\alpha = \alpha_m$, and $v = 0$. Plot this as point P1 on the phase space graph, Fig. 7b. As the bob swings down to the origin, 'α' decreases smoothly while 'v' increases smoothly, until it reaches the point of zero angular displacement ($\alpha = 0$) and maximum velocity ($v = v_m$). In phase space, this appears as a smooth arc from point P1 up to point P2. As the bob moves on to the left end of its path, the phase space plot curves down to the point P3. On the return trip, velocity becomes negative (counter-clockwise), the phase plot passes through point P4, and then ends up back at the starting point.

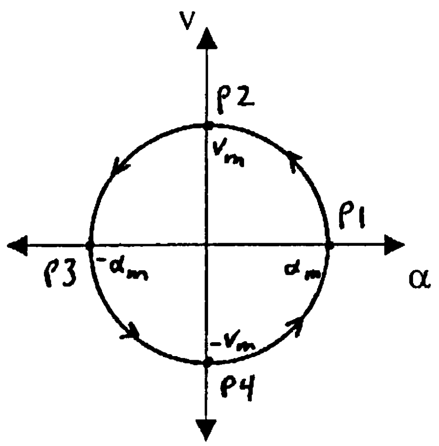

FIGURE 7b – The ideal pendulum in phase space

The picture is really quite simple and elegant. As the bob swings back and forth, there exists a corresponding point in phase space that travels around the circle shown in Fig. 7b. No matter what the 'state' of the bob – momentarily stopped at the right, moving with some velocity 'v', momentarily stopped at the left – we can capture the essence of the pendulum by *a single point* in phase space. This point describes the instantaneous energy of the pendulum. Insofar as the physics of the pendulum is concerned, the phase space point essentially *is* the pendulum.

This issue must be emphasized. There are many other characteristics of a real pendulum that would serve to create a true 'total description': The material and size of the bob, the color of the arm, the sound it might make, and so on. *None of these things are essential to its operation as a pendulum.* As far as how fast it swings, there is only one essential feature, namely, the length of the arm (as per the formula given earlier). As far as its description as a dynamic system, there is only one essential feature, namely, the energy state of the bob -- and this requires us to track two variables, position and velocity. All other features, while being important to a total physical description, are unimportant to its dynamics. It functions as *one system*, and this is captured in the *one point* moving in phase space. And the *trajectory*, or pattern of movement, of this point tells us much about the dynamic nature of the system.

Now consider a real pendulum, swinging free as before, but this time with friction. Each sweep of the bob loses a small amount of energy, and the displacement 'x' becomes a little smaller with each pass. What happens in phase space? Our point continuously 'loses energy' also, moving not in a circle but in an inward spiral. The phase point spirals in to the origin (zero 'x' and zero velocity) as the bob grinds to a halt -- see Fig. 8:

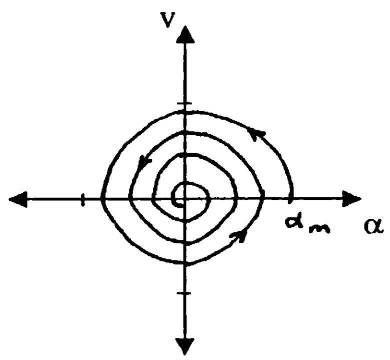

FIGURE 8 – Frictional pendulum in phase space

As with the ideal pendulum, there is no chaos here either[8]. What we do have is a clear example of how to use phase space descriptions for dynamic systems. The spiral shows us, at one glance, the whole history of the pendulum. At any point in time, we can locate its current state, know where it was, and know where it's going. It is a highly deterministic, highly predictable system.

Consider a third version of the pendulum example, in which we are able to supply a small 'kick' of energy once per cycle, perhaps with a small electromagnet. Starting at some given angle, the pendulum now swings a little *higher* with each pass, rising first to a horizontal level (Fig. 9a), then approaching a vertical position on each side (Fig. 9a):

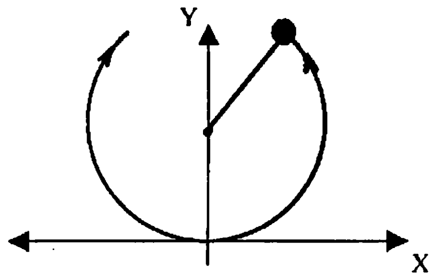

FIGURE 9a – Pendulum driven progressively higher

In phase space, the point spirals outward, until displacement approaches a maximum of +180° and –180° (Fig. 9b):

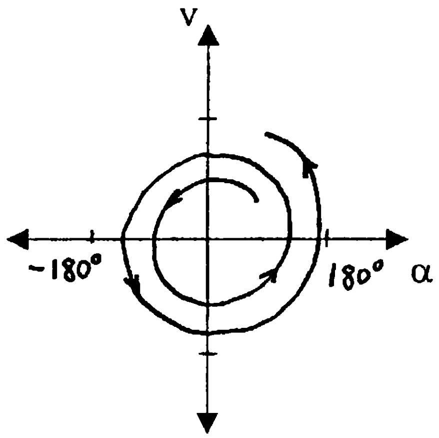

FIGURE 9b – Progression in phase space

Now add just a bit more energy, and the pendulum goes over the top, such that it now travels only in the (say) clockwise direction. There is no more 'return trip'. Consequently, there is a sudden change to the phase space pattern. The bottom lobe vanishes, since velocity is now only 'positive' (clockwise) – see Figure 10. The phase space point now travels up the semi-circle, hits a peak velocity (with $\alpha = 0$, i.e. at the bottom of its swing), travels down the other side, and then instantly jumps back across[9] to the point at $\alpha = +180°$.

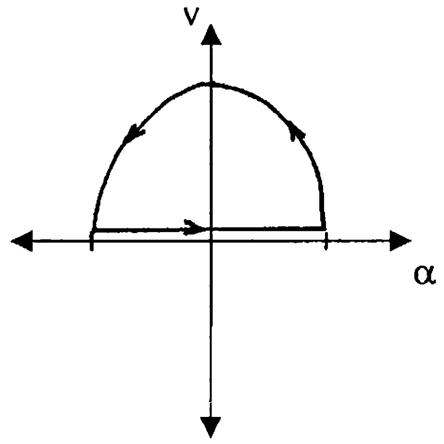

FIGURE 10 – Phase space 'over the top'

With further energy, the upper lobe 'rises' above the origin, because now velocity never equals zero. As we drive it even harder, the velocity difference between 'bob-vertically-up' and 'bob-vertically-down' becomes proportionately smaller, so the semi-circle begins to flatten out as it rises. Eventually the lobe gets completely compressed and approaches a flat line segment (Figures 11a-c):

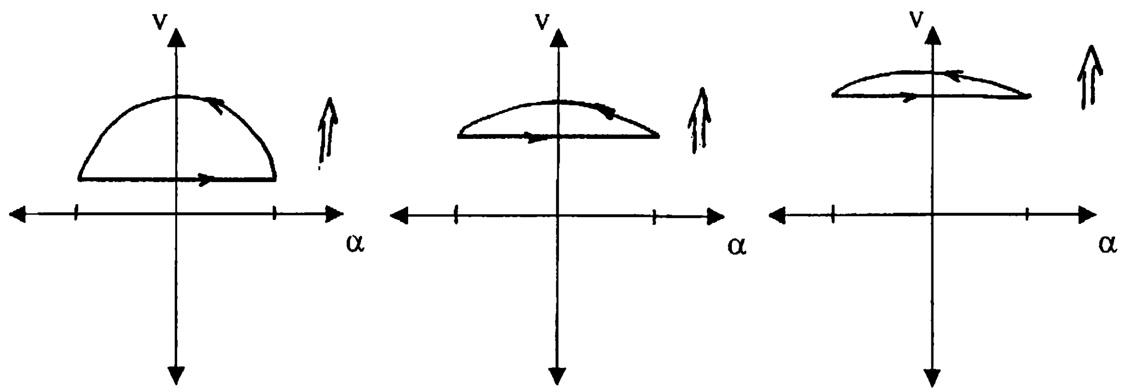

FIGURE 11a FIGURE 11b FIGURE 11c

This sequence of diagrams clearly shows the 'energy evolution' of the pendulum. There is a one-to-one correspondence between the 'actual pendulum' sequence and the phase space sequence.

The pendulum was an example of a dynamic system in which a physical object was moving in space. Phase space analysis, though, applies to any situation where mass or energy are changing with time. Consider a second example of a camera flashbulb firing. The situation can be described, in simplified form, as follows. We have a circuit consisting of a voltage source (a capacitor), a resistor (R1) representing the resistance of the wiring, a switch, and light bulb (modeled as another resistor, Rb) -- see Fig. 12a. For sake of simplicity, assume R1 = Rb. Electrical energy is stored in the capacitor. At the desired time, the switch is closed, allowing electricity to flow through the bulb. The current rushes in very fast, causing the bulb to emit light; the voltage quickly reaches a peak value (V_{max}), and then decays somewhat more slowly down to zero.

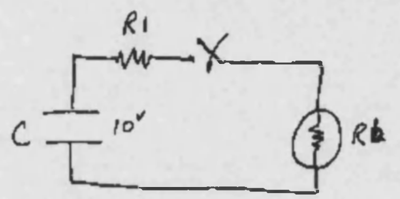

FIGURE 12a

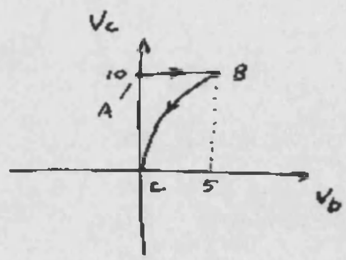

FIGURE 12b

Our simplified circuit has three basic elements: C, R1, and Rb. We can describe the dynamics of the circuit by looking at the voltage over any two of these, since the third voltage is fixed by the other two[10]. So take capacitor voltage Vc and bulb voltage Vb as the two state variables.

Voltage Vc starts 'charged' at, say, 10 volts. When the switch is closed, current flows out of the capacitor and through the two resistances until the voltage drains down to zero. Voltage Vb, initially at zero, jumps quickly up to 5 volts, emits a bright light, and then decays also to zero. If we plot the phase space, using Vb and Vc as our two axes, we get Fig. 12b: starting (before switch closure) at the point A(0, 10v), moving quickly across to point B(5v, 10v), then exponentially decaying down to the origin point C(0, 0).

This is not often done in analyzing electrical circuits, because it is typically more useful to know the individual voltages and currents than to depict a phase space point moving in a multi-dimensional space. I would suggest that this is an underutilized method of analysis, and perhaps new insights into electronic systems could be gained by studying phase space descriptions.

4) Phase Space in More Complex Systems

So where does chaos enter phase space? Potentially, whenever the three key conditions -- nonlinearity, feedback, and deterministic processes -- occur. Typically this occurs with two (for a map) or three (for differential) equations that are interlinked. The classic example of chaos is the very first one, discovered by Edward Lorenz in the early 1960's. The Lorenz system consisted of three differential equations, with three variables (x, y, z) each varying with a parameter that may be considered 'time'.

The phase space point thus traces out a trajectory in a 3-dimensional phase space, and can be plotted with the help of a computer. The plot is not a simple pattern as with the pendulum, but a complex, multi-path 'figure-8' pattern -- see Figure 13. Another example is the 'Duffing attractor', shown in Figure 14. These systems are chaotic because one cannot predict how the trajectory will progress, short of simply performing the calculation.

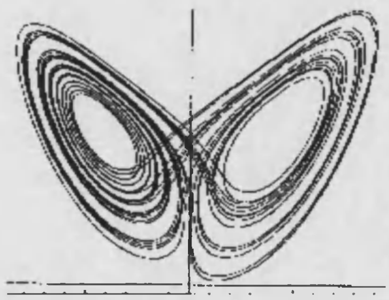

FIGURE 13 – Lorenz attractor

FIGURE 14 – Duffing attractor

The pattern that forms is a visual representation of the strange attractor of the system. It depicts the system moving through an infinite number of states, never exactly repeating itself, yet staying within a defined region of phase space. As in the earlier logistic equation example, the system is drawn into the attractor region. One may start the system (or set of equations) in any particular configuration, and this corresponds to a particular point in phase space. If this initial point is outside the attractor region, the system will evolve such that its system states, and corresponding phase space points, are drawn toward the strange attractor[11]. The system inherently 'prefers' only a certain subset of the possible states and will not enter other states unless driven there by external forces. If an outside force does disturb the system, it will tend to return to the attractor region.

Chaotic systems display three important characteristics: One, they are unpredictable *in detail*. Two, they show *large-scale stability and 'predictability'* by staying within the strange attractor. Three, they are *very sensitive to small change*. I have discussed the first two, and I now want to say a few words about the third.

One typically hears of chaotic systems having "sensitive dependence on initial conditions". Assume, for example, that we start the Lorenz equations at some point A(1, 2, 3) and then watch the movement through phase space. Call this "Run A". If we now calculate a "Run B" starting from the point B(1, 2, 3.0001), one would have typically assumed that the progression of the system would be virtually identical with that of Run A. A small change in initial conditions would not be expected to make a big difference, and in fact, this is true for many *linear* systems (including linear approximations of nonlinear systems), as well as all compact nonlinear systems with only fixed-point or limit-cycle attractors.

But this is decidedly not the case for a chaotic system. Due to the nonlinear feedback, a small difference gets multiplied by a factor greater than '1'; this difference increases by being multiplied by itself with each time increment. Thus, for a difference of .0001 in the logistic equation, with a power of 2, the 'error' of 0.01% becomes fully 10% after only 10 iterations[12].

Again, it may help to look at a numeric example. Take the logistic equation sequence, with 'c' = 3.58 (shallow chaos), and $x_o = 0.7$. Call this the baseline sequence. Then compare this to four other sequences, each with increasing variation in initial conditions: sequence A ($x_o = 0.701$), sequence B ($x_o = 0.7001$), and sequence C ($x_o = 0.70001$). Though they all start relatively close together, each 'error' sequence gradually diverges from the baseline, until eventually there is no correlation at all to the baseline. If we sum up the magnitude of the error at each iteration, we get a nice picture of the accelerating divergence -- see Figure 15. Note that the sequence with the biggest initial error diverges first (A), then the next biggest error (B), and then the last (C). If we were to put the system into deep chaos, say c = 3.7, we get even faster divergence of all three series – see Figure 16. The actual values of the three series are shown in Figure 17. Note that after about 25 iterations all sequences have diverged from the baseline and from each other, and appear as independent, random sequences.

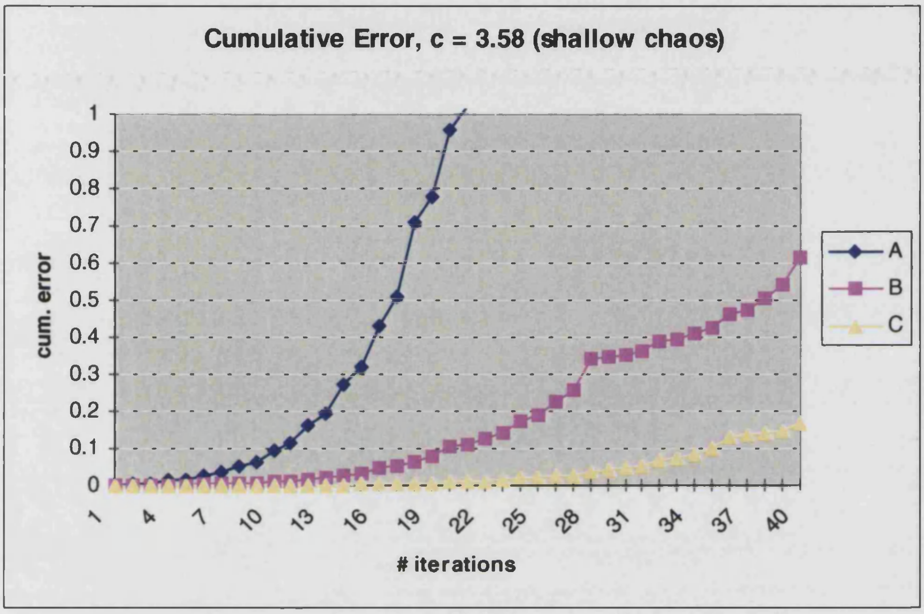

Figure 15 – Divergence rates based on 'initial difference' (A>B>C).

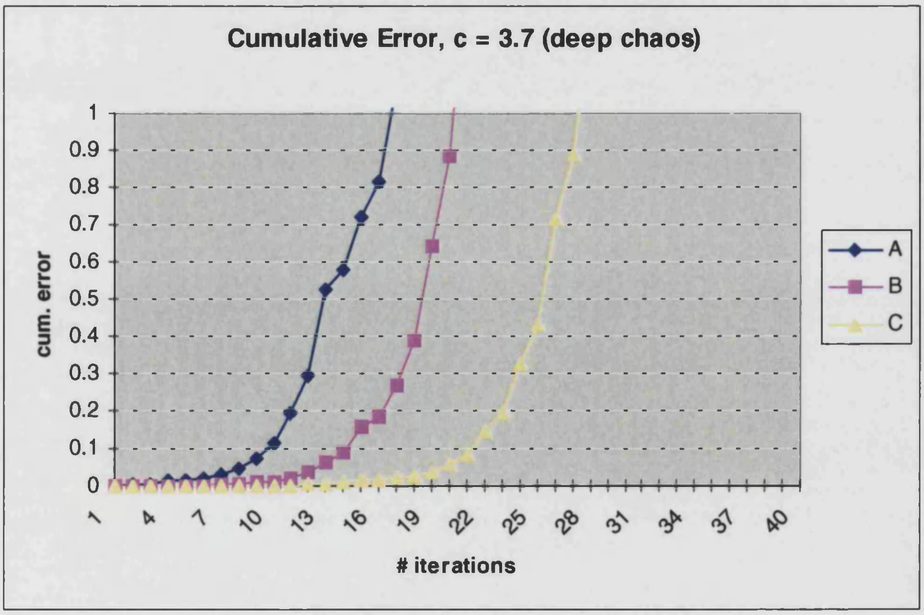

Figure 16 – Divergence rates, 'deep chaos'.

	Baseline	**A**	**B**	**C**
Iteration	**0.7**	**0.701**	**0.7001**	**0.70001**
1	0.777	0.77552	0.77685	0.77699
2	0.6411	0.64414	0.64141	0.64113
3	0.85133	0.84813	0.85102	0.8513
4	0.46829	0.47658	0.46911	0.46837
5	0.92128	0.92297	0.92147	0.9213
6	0.26834	0.26306	0.26774	0.26828
7	0.72643	0.71728	0.72541	0.72633
8	0.7353	0.75033	0.73701	0.73547
9	0.72014	0.69314	0.71716	0.71984
10	0.74569	0.78698	0.75052	0.74618
11	0.70166	0.62029	0.6928	0.70077
12	0.77453	0.87146	0.78747	0.77586
13	0.64614	0.41445	0.61923	0.64343
14	0.84598	0.89792	0.8724	0.84888

		0.3391	0.4118	0.4746
15	0.4821	4	8	5
		0.8292	0.8962	0.9226
16	0.92381	5	7	2
		0.5238	0.3439	0.2641
17	0.26041	9	9	4
		0.9228	0.8349	0.7191
18	0.71261	9	5	8
		0.2633		0.7472
19	0.75775	1	0.5099	6
		0.7177	0.9246	
20	0.67919	2	4	0.6988
		0.7496	0.2578	0.7787
21	0.80619	1	3	7
		0.6944		0.6374
22	0.57811	7	0.708	6
		0.7850	0.7649	0.8550
23	0.90243	8	2	9
		0.6243	0.6653	0.4584
24	0.32579	1	3	7
		0.8678	0.8238	0.9186
25	0.81271	3	6	2
		0.4244	0.5369	0.2766
26	0.56318	1	2	1
		0.9038	0.9199	0.7403
27	0.91023	6	6	6
		0.3215	0.2724	0.7112
28	0.30233	3	6	4
		0.8071	0.7334	0.7598
29	0.78042	5	3	9
		0.5759	0.7233	0.6750
30	0.63404	5	9	9

Figure 17 – Divergence data points.

There are three lessons to learn here: (1) large variation causes divergence faster than small variation, (2) all variation, no matter how small, eventually causes divergence, and (3) it's not just "initial conditions", but *any* small change at *any* point in time. To expand on this last point: take any 3-body system in space -- e.g. a planet with two orbiting moons. Observe the system to evolve as it will. Then cause a 'small variation', say, by firing an explosive charge on one of the moons. The system will now evolve differently than it would have otherwise. At first, imperceptibly, then gradually more and more -- maybe years, maybe millennia -- the two futures would appear 'completely different'. Completely different, that is, in terms of the positions and velocities of the three bodies[13]. It is still the same system in either case, just with two different 'future orbits'.

How different is 'completely different'? The answer depends on the *sensitivity of the observer*. Technically speaking, the difference is there immediately after the effect; it just may be very small or hard to detect. A sufficiently sensitive organism or measuring device could conceivably detect virtually any change. We of course measure change by our own human standards, and a great many changes are below the level of our sensitivity. We either cannot detect a given change, or see it as 'inconsequential' or 'trivial'. This is our human bias. Other systems, or other organisms, may not be so disposed toward a particular change.

The explosion in my previous example may be thought of as an *intervention* in which energy is inserted into the system. This 'energy insert' could be anything from a single firecracker to an atomic bomb. Clearly, different levels of energy will produce different effects. Let me offer a new idea here: For any given system, I submit that there exists a *critical threshold of energy*. Below this threshold, the system's future is inevitably altered, but to a minor degree: the overall appearance of the system, i.e. the overall pattern of the virtual strange attractor, remains unchanged. In real physical systems, virtual strange attractors are robust, stable patterns. A firecracker will not cause a moon to fly off its orbit in any human lifetime, if ever. And yet the energy insert is not to be ignored. The path through phase space is changed, and the effect, *no matter how small*,

is eventually felt: the "positions and velocities" are different than they would have been otherwise.
But above the threshold, the energy insert is high enough to structurally change the system, resulting in a readily apparent reordering and redistribution of the system boundaries. The strange attractor undergoes a fundamental change, much as the pendulum pattern changed when it went 'over the top'; this might correspond to the detonation of a nuclear explosive on one of the moons. The system is now at a higher energy level, still chaotic, and now even more unpredictable, because without the strange attractor as a guide we have no information on what will happen.

What about our real solar system? This system of a sun and nine planets – so regular and unchanging that it was the very inspiration of the Cartesian/Newtonian 'clockwork universe' – seems an unlikely place for chaos. This question has been debated for years, ever since the emergence of chaos theory. And it is a critical test case. The solar system is nearly, but not totally, frictionless. Small bits of dust, asteroid debris, and innumerable particles continually rain down on the planets. The gravitational field from the other planets acts as a small drag or boost. The planetary system is a 'dissipative structure' (a system which continually dissipates energy, such as via friction), but of the smallest degree. Chaos appears readily in highly dissipative systems, but weakly dissipative systems were thought to be immune. Chaos found here could mean chaos everywhere.

The most recent analyses indicate that, in fact, the solar system is chaotic. Not only is the movement of each planet unpredictable (to a greater or lesser degree, depending on time scale), but so too is the actual *presence* of planets over the long term. The first indication of chaos came in the 1980's, when MIT researchers J. Wisdom and G. Sussman created computer models to project planetary motion millions of years into the future. Said Wisdom, "After 845 million years of evolution, we saw clear signs that Pluto's orbit was chaotic" (Frank, 1998: 57). More recent analysis has focused on the inner planets. Calculations by French astrophysicist Jacques Lasker, confirmed by American researcher Tom Quinn, show that "the motion of the inner planets -- including Earth -- is chaotic in the technical sense." (ibid, p. 58). Thus, the more accurate picture of the planetary movement is, in the words of astrophysicist Adam

Frank, to see "each orbit...[as a] tightly woven bundle of orbits, an infinitely tangled web of paths." (ibid, p. 56).

Interestingly, Wisdom distinguishes between "wild chaos" and 'normal' chaos -- corresponding roughly to my concepts of 'deep' and 'shallow' chaos[14]. Under conditions of wild chaos, there is sufficient sensitivity to cause major variations in the orbital path of a planet, and perhaps even result in it being flung out of the solar system. The present number of nine planets is probably only a chance number. According to George Lake, director of NASA's high performance computing program, "Now we understand that planets may not get permanent membership in their solar systems. Is it possible that a billion years ago there were 12 planets and, perhaps, a billion years from now there may only be six?" (ibid). Lasker's projections indicate roughly a 0.1% chance that Mercury will be thrown out of the solar system sometime in the next 5 billion years. The orbit of Mars, too, could become gradually more elliptical, causing it to come into close proximity to Earth. If this happens, either Mars or the Earth could be ejected into deep space. The one thing working in our favor is that Earth is more massive, thus less likely to be the one thrown out of its orbit.

So it seems that chaos is always with us, even in the most stable, least dissipative systems we know of. Therefore, the most reasonable conclusion is that *chaos exists in every dynamic system*, to a greater or lesser degree[15]. One can speak of a '*degree of chaocity*', being low for the apparently stable systems and high for the unstable ones. And again, I use the term 'system' here to mean any persistent structure of mass/energy, in particular any structure that embodies a continuous internal movement of mass/energy – which is, after all, every physical structure. Every physical object or collection of objects – a cell, a crystal, a tree, a human being, an ocean, an ecosystem – is dynamic, chaotic (in some sense), and is subject to investigation through the methods of nonlinear dynamical systems, i.e. phase space analysis.

Since all real physical systems are dynamic (if only at the atomic level), and all appear to act in a manner corresponding to the chaotic dynamics we find in our mathematical models, then it is reasonable to assume that *for each real system there exists something corresponding to a strange attractor pattern in its phase space description.* And in fact this is borne out by experience. Everywhere we see real systems, from the solar system to weather patterns to the flow of water down a river bed, that act in a manner that corresponds to a strange attractor: they exhibit unpredictability in precise detail, and yet display large scale stability.

Thus, even though we may not attribute to them the formal, technical definition of a strange attractor (which is defined only for closed systems), there nonetheless exists a strange-attractor-like quality within all physical systems. To differentiate from the formal definition, I will henceforth refer to this attractor-like behavior of real systems as a *'quasi-attractor'*, or 'virtual strange attractor'. I find this concept very useful in describing the nature of physical systems, and it permits a deeper investigation into their dynamics and interactions with the world.

The question is how to go about performing this sort of investigation. How does one define the state variables in such a way as to capture the essential information about the energy dynamics of the system? I offer an answer to this question by beginning, somewhat paradoxically, with the most complex and evolved biological system we know of: the human brain.

NOTES:

[1] Aristotle, *De Anima*, 984 b28.

[2] There is an element of randomness to the wave equation, but this is only relevant when a measurement is being taken. Some see this as a form of indeterminism in the basic structure of matter, and in fact is points to a universe in which a hidden indeterminism lies behind the deterministic equations of physics.

[3] Two of the forces, electromagnetic and weak nuclear, have been theoretically unified into a single 'electro-weak' force, but I will keep with the traditional usage and refer to them as distinct forces.

[4] For most values of x_0. Some x_0 will give rise to ordinary (finite) limit cycles

[5] Technically, the points are called a 'Poincare map', and represent a cross-section of phase space which contains the actual strange attractor. More on this later.

[6] See Shaw (1984), Packard (1980), and Takens (1981).

[7] This implies use of 'polar coordinates'. The reference point $\alpha = 0$ will be defined as 'straight down', with positive angles to the counter-clockwise and negative angles clockwise (thus ranging from $-\pi$ radians to $+\pi$ radians).

[8] Or better, very constrained chaos -- more on this later

[9] This jump appears because of the 2-D depiction shown here. The actual phase space trajectory would be three-dimensional (e.g. cylindrical). I am showing a 2-D projection, which more readily serves the purpose at hand.

[10] The sum of the three voltages must be zero, by Kirchoff's Voltage Law.

[11] Not all initial points in phase space will be drawn to the same attractor. Each attractor has a 'basin of attraction' that defines a region from which all initial points will be drawn.

[12] Take 1.0001 and keep squaring it ten times; one gets 1.1078..., representing more than 10% variation.

[13] In reality, of course, this can be difficult or impossible. A large-scale system like the planets can not, properly speaking, be 'experimented' on, simply because there is no basis for comparison. If we were to detonate an explosive on the moon, we have no basis for knowing to what degree the system (path through phase space) has been altered. All we know is the long-term stability of system strange attractor (i.e. moon moving regularly around the Earth), and with a sufficient blast this could be clearly altered.

The same problem occurs on the Earth. Global warming is a kind of 'experiment'. We see global temperatures rising, but we have no way of knowing if, or to what degree, this is due to human actions – because we have no 'unwarmed' Earth to compare to. In a laboratory, where conditions are *relatively* isolated and *relatively* repeatable, one can more easily confirm chaotic effects.

[14] Sufficiently 'deep' chaos will approach the critical threshold of energy, resulting in a fundamental restructuring of the system.

[15] It is interesting to observe that, even quite recently, the common view among experts in complexity theory has been that 'some physical systems are chaotic' and 'some are not'. For example, Bak and Chen (1991) write: "In nonchaotic systems, such as the earth orbiting around the sun, the uncertainty [of the orbital path] remains constant at all times" (p. 51).

Chapter 4 – Mind and Brain in Phase Space

'Mind permeates the universe'. This is an ancient theme, reflected in many varieties of human thought, from pre-historical animism, to the philosophy of the Greeks, to Hindu mythology, to continental Idealism. Recent advances in philosophy of mind and in chaos theory allow us to give a new reading of this old concept. It is my goal in this chapter to put forth a new theory of mind, one that suggests it is a truly universal quality. This theory, which I call hylonoism, is fundamentally participatory as I have defined it earlier: it is based on the exchange of matter and energy, wherein the subject gives something of itself, receives something from the object, and incorporates it into itself. This whole process I see as having a deeply noetic quality.

An understanding of the dynamics of the human brain and its relation to mind is central to the discussion at hand, for two reasons: first, the mind coexisting with the human brain is something that we know most directly and immediately; and second, because the human mind is a particular case of the more general phenomenon of participatory mind. Things that we can intuit and learn about our own minds will have necessary implications for the broader understanding of mind. The brain dynamics that coexist with our minds gives us a model of interactive systems that we may apply generally, and analysis via chaos theory will show that a number of important aspects of mental operation are describable in a new way. In this chapter I explore the dynamics of the brain, suggest an approach to understanding it through chaos theory, and extend the resulting insights to physical systems in general.

1) The System of the Human Brain

Paraphrasing Skolimowski: The human mind is a participatory mind; it partakes of reality, and reality partakes of it. The focal point for the human mind is the brain, an extraordinarily complex system compressed into an exceptionally small space. It consists of perhaps 100 billion neurons interconnected in massive feedback loops, continuously exchanging energy and mass. Each neuron transmits and receives signals from up to 10,000 other neurons. It is primarily the action of these neurons that results in the mind being expressed or mediated via the brain.

The portion of the brain believed to be most responsible for higher-level thought is the neocortex. This comprises up to 80% of the brain's volume. If we could extract and unfold the neocortex, it would look roughly like a thin disk about 60 cm (2 feet) in diameter, but only about 3 mm (0.1") thick[1].

It is well-known that the brain is partitioned by scientists into a number of different regions. The standard Brodmann map identifies some 43 different areas of the neocortex. In broad terms, these 43 areas can be organized into four main functional groups: visual, auditory, somato-sensory, and motor. Additionally, there is the readily identifiable physical structure of the symmetry of left and right hemispheres. And the well-known 'triune brain' description identifies roles for both the 'reptilian' and 'paleo-mammalian' parts of the brain, in addition to the neocortex. And even these three can be subdivided into a number of subsystems – see for example Gazzaniga (1985). Each sub-region clearly has its own function, and yet all share certain common features, and all seem to be integrated by the unifying action of the neocortex.

Here I want to focus on the (perhaps surprising) *homogeneity of structure* throughout the neocortex. Neocortical neurons are primarily of two types, 'pyramidal' and 'stellate'. Stellate neurons are specialized cells that accept input signals to the neocortex from the sense organs, via the thalamus. Pyramidal neurons are the data integrators of the neocortex, summing up signal from adjoining neurons, and then transmitting an output signal (the 'action potential') to other cells in either the neocortex or other parts of the brain. Pyramidal neurons constitute the majority of cortical cells, and they appear to be the key elements in the processes of higher level thought.

Virtually all of the neocortex has a common functional structure. The two most significant organizational features are *layers* and *columns*. All parts of the neocortex (with perhaps the exception of certain parts of the motor cortex) have six interconnected layers: there is the thin outer layer #1, layers #2 and #3 consisting mostly of pyramidal cells, layer #4 acting as the sensory input layer (thus with a higher density of stellate cells), and layers #5 and #6 serving as output areas. Electrically, information flow occurs mostly up and down within 'vertical' columns of cells, about 0.5 to 1 mm wide.

There are regions of the neocortex that specialize in the input (from senses) and output (to muscles) of information; these are the "primary projection areas". They constitute a small portion, perhaps 10%, of the overall neocortex -- Brodmann areas 1, 2, 3, 17, and 41 for sensory inputs, and area 4 for motor output. Even though small, they play an important role in differentiating the varying qualia (subjective or phenomenal feeling) that we experience via the different senses. The remaining 90% is referred to as "secondary" and "tertiary" projections, but these are ill-defined regions, and function more as general information processing areas. Also, even the hemisphere distinction is, structurally speaking, of relatively minor significance. Most inter-hemispheric connections occur between corresponding Brodmann areas[2], and thus they function more as single units than distinct hemispheres.

Thus most of the neocortex, which in turn is most of the brain, is a large matrix of interconnected, non-function-specific neurons. There is only minor variation within the neocortex, the difference being primarily the number of stellate cells (more prevalent in the sensory regions), and the cortical thickness (thinnest in sensory, thickest in motor regions).

2) Action of the Neurons

In simplified terms, each neuron acts as an individual decision element. A neuron receives both 'positive' and 'negative' inputs from other neurons via synapses on its various dendrites or even the cell body itself. The neuron acts to integrate, or sum up, the incoming positive (excitatory) and negative (inhibitory) signals. When the internal neuron voltage reaches a critical threshold, it 'fires' a signal, called the 'action potential', out along its axon. This is a small electro-chemical potential (voltage) that moves rapidly -- something approaching 100 m/s -- out toward other neurons that will receive this signal. They in turn are stimulated upward or downward to fire, transmit to other cells, and so on, in endless interconnected feedback loops.

The axon extends out from the body ('soma') of the neuron, and then branches out at the end into numerous collateral axons that serve as the connections to other recipient neurons. Each axon branch terminates in a small bulb ('bouton') that communicates with a similarly-shaped bulb ('dendritic spine') on the dendrite of another neuron[3]. The intervening space, the *synaptic gap*, is on the order of 20 x 10^{-9} m. Any given neuron communicates with between 10 and 10,000 other cells, and often will have multiple contact points (boutons) per cell.

The region around the synapse serves not only as communication channel, but also, equally important, it may play a crucial role in memory. In a theory dating back to Donald Hebb's work in the 1940's, the synapses are able to physically and permanently change their state, and thus 'record' information. Hebb's theory is that memory results from the repeated use of certain neurons or groups of neurons, sometimes referred to as 'neuronal loops'. If, for example, we were to reread over and over a certain passage of text from a book, it is reasonable to assume that certain groups of neurons will be repeatedly firing over and over. Through the repeated firings, the synapse connection becomes 'stronger', and, in Hebb's words, the "efficiency [of communication] is increased" (Hebb, 1949: 62).

We can think of the synapse as initially being resistant to energy exchange, but becoming less resistant with use. In electrical terms, we can view it as a resistor that changes in value over time. Neuroscientists have now identified a number of specific ways in which a synapse can change; these include changes in (a) the size of synaptic components, (b) the number of vesticles in the bouton, (c) length of the dendritic spine, (d) size of the postsynaptic thickening, (e) subsynaptic plate perforation, and (f) presynaptic dense projection. Hebb's model is thus confirmed by recent research, and in fact his theory "remains the best attempt to combine the principles of psychological reality and the facts of neuroscience." (Kolb & Whishaw, 1990: 529). Few brain researchers today doubt that physical changes in the synapse play a central role in memory: "[I]t seems likely that long-lasting behavioral change stems from a morphological change in neurons." (ibid, p. 531).

If we accept Hebb's model as true, then the amount of information stored by the synapses is extremely large. If the brain has 10^{11} neurons, and each has an average of 1000 synaptic bulbs at the end of its axon, then the brain has something like 10^{14} synapses[4]. If we assume that the six synaptic variables mentioned above can take on, conservatively, three values each, then we have roughly 1000 different states (3^6) per synapse. These 1000 states correspond to 10 'bits' of information ($2^{10} = 1024$). Therefore, we can conservatively estimate that the human brain holds on the order of 10^{15} bits of information[5].

Compare this to an ordinary desktop PC. At the present time, a 'large' PC memory is around 1 gigabit, equal to 1000 megabits, or 10^9 bits. This memory size is sufficient, as we know, to store in exact detail thousands of pages of printed text and hundreds of photographic images. If we allow that the brain holds 10^{15} bits, this is equivalent to 1 million gigabits; in other words, the brain has the storage capacity of at least 1 million PC's.

Consider the complex, clever tasks that a computer can perform, given its dual limitations of (1) 'only' 10^9 bits of memory, and (2) the ability to process only one operation at a time, as opposed the parallel processing of the brain which executes around 100 billion operations simultaneously. Dualist philosophers like to ask how this mere mass of cells in our heads could produce the exquisite performance and abilities of the human mind. Such comparisons should help alleviate this kind of concern.

Of course, one must be cautious of such mechanistic comparisons, and I make this one only to illuminate the physical complexity of the brain. My main point is that this 'mere mass of cells' consists of 100 billion neurons and 100 trillion synapses, and that this degree of complexity can reasonably account for a considerably high level of thought, behavior, and action.

* * * * * *

Neurons are stable patterns of matter, or rather of mass-energy, that exchange mass-energy with other neurons and with other organs in the body. I have focused on the voltage of the action potential, as communicated across the synapses, as being central in this process. When the action potential reaches a terminal bouton, neurotransmitter chemicals are released into the synaptic gap[6]. The neurotransmitters act as a key and unlock an opening on the other side of the synapse, into which flows '+' or '-' ions from the surrounding fluid. The effect is a small net increase in '+'/'-' charge of the recipient neuron, which is summed with all other inputs. Neurotransmitters may then be absorbed back into the bouton, via a process called 're-uptake', to await the next pulse.

It is interesting that a 'voltage' traveling down an axon results in a 'voltage' accumulating in recipient neurons. This seems to be significant for at least four reasons: First, the electric potential can travel down an axon much faster than could a chemical substance. For an organism needing to react to a swiftly changing environment, this is critical. Second, the charge itself can be carried by individual atoms, such as sodium and potassium, which are smaller, lighter, and more mobile than larger molecular compounds. Third, electric potential is 'generic' in the sense that any ion could play a comparable role; nothing is inherent in the nature of sodium or potassium that would make them the only possible carriers of charge. Fourth, electric charge is 'automatically additive'; the total net charge of a collection of '+' or '-' charges is determined instantaneously and without any processing required, by the very nature of the electric field.

So ultimately, energy itself is passed from one neuron to the next. How much energy is transferred is not necessarily predictable in advance. The transfer may be modified by the conditions around the synapse — for example, the amount and types of neurotransmitters, surrounding ion concentration, presence of other chemical agents (such as narcotics), physical changes to the synapse via repeated usage ('memories'), and so on. These conditions may result in less, equal, or more energy being transferred than arrived at the bouton. Energy may be blocked completely if conditions in the gap do not allow the opening and in-rush of ions to occur. Or, a very high density of ions could flood the recipient neuron, resulting in a much larger net charge than that which triggered the event (much like the action of a transistor).

Neural firing is correlated with changes in the synapses. Part of the energy transmitted from one neuron to the next is absorbed by the synaptic region. The 'loss' of energy is recorded in the synapse. The change, as we know, is such that future firings become more efficient, transferring more of their energy.

Perhaps a simple analogy will be useful here. Consider the synapse as a section of a riverbed. The water flowing steadily through the river represents the base level metabolic activity, such nutrition for cells, carrying away of wastes, etc. Every once in awhile a boat comes along. Each boat can be thought of as a firing. The river is in a very sandy environment, and tends to silt up quite quickly. So each boat drags behind it a dredging tool, which scoops out some small amount of sand. The dredging effort slows down each boat a bit, but makes overall travel much easier for all.

Each boat that passes makes a small change to the riverbed, which persists for a time, but tends to get erased by silt. If lots of boats travel down the river, two things happen: the river channel becomes very deeply cut, and the incremental effort by each boat is small ('many hands make for light work'). If not so many boats come, then the river silts up — the channel becomes shallow, and the occasional boat that does come along has a very slow go of it.

A deep channel, or rather a sequence of deep channels, represents a deeply etched memory. A deep memory has low resistance. It easily admits neural firings, is easily 'recalled', consciously or in sleep. Note that millions of synapse etchings are required to recall a particular thing or event; one synapse alone can in itself represent virtually nothing.

Energy continually flows through the brain. Nutrition-input and waste-output go on continuously. Sensory inputs trigger sequences of neural firings, which can result in outputs to the various muscles of the body. The patterns of neural firings are slowly and continuously etched into the physiology of the synapses, recording experiences which will alter future perceptions.

3) Mind and Brain in Phase Space

The brain is a dynamic, nonlinear feedback system. It consists of physical units, the neurons, which continuously exchange mass and energy. From the preceding discussion, one should expect two things of such a system: it should exhibit chaos, and it should be amenable to phase space analysis. In fact, there is strong evidence in support of *both* of these contentions – as I will explain.

First, recall the pendulum example. The swinging pendulum has several physical characteristics, but only two -- the position and velocity of the bob -- are necessary to describe its essential dynamics as a system.

I have already noted that the position and velocity are the two components of a 2-D pendulum needed to describe the total energy of the system as a pendulum. In more general terms, one needs position and *momentum* (equal to mass x velocity) to fully account for the system energy. More accurately, to describe a general mass moving through 3-D space, one needs *three* position equations (one for each dimension), and *three* momentum equations -- six total. Thus, the phase space for such a moving mass would require six dimensions. To plot the phase space evolution of our solar system, we would need (6 equations)x(9 planets) = 54 dimensions.

Penrose (1989) gives a good description of this process. He elaborates on the subject of my earlier discussion, explaining how phase space descriptions of physical systems are encompassed by a *single moving point*:

> A single point Q of phase space represents the entire state of some physical system… [T]he entire evolution of the system in time -- no matter how

> complicated that system might be -- is described in phase space as just a single point... (p. 177).

How can all this apply to the brain? If we want to capture the brain dynamics in phase space, we need to account for the essential energy dynamics. One approach would be to use brute force, and consider the brain as a vast collection of sub-atomic particles, each in its own quantum state. One could then describe the phase space of the entire system using quantum techniques. This would result in a state space (Hilbert space) representation, with a single point moving through that space. This is certainly a theoretical possibility, though perhaps not the most useful.

Viewing the brain as a collection of particles has the virtue of theoretical simplicity, because it ignores higher levels of structure. But the brain is not just some miasmic grouping of particles; it is structured in specific ways, into atoms, molecules, proteins, cells, columns of cells, and layers of cells. The brain is a hierarchy of physical structure, and it would seem that the most promising account of brain activity must take account of this structure.

Of the various levels of structure in the brain, that of the neurons appears to be the most significant. As far as we know, all states of consciousness correlate to neural states. Furthermore, it seems likely that these neural states are *unique*; that is, every possible configuration of neural states corresponds to precisely one mental state. If we could somehow track the instantaneous status of every neuron in the brain, we would find that certain combinations occurred when we were happy, others when sad, others when seeing 'blue', and so on. It is highly unlikely that any given combination could recur in conjunction with differing mental states (though many combinations would represent multiple simultaneous experiences, such as 'back pain', 'seeing red', and 'listening to Mozart' all at the same time).

The issue of tracking the instantaneous state of every neuron in the brain is complex and daunting, to say the least. Every neuron exists in a range of conditions, including rest, mild excitation, onset of action potential, potential in transit, synapse release, etc. At the most basic level each neuron can be categorized as 'on' (in the process of firing) or 'off' (at rest). Many computer models in fact regard neurons in just this way, as on/off electrical switches. But this does not capture the continuous, analog nature of its action. To view a neuron as simply 'on' or 'off' is to exclude or ignore much of its complexity[7].

When considering a system with numerous analog variables, the phase-space approach has much to offer. Every axis in a multi-dimensional space represents a continuously changing variable, and the 'point' in phase space represents the instantaneous state of *every* element in the system. For the brain, one option might be to consider the action potential as the appropriate system variable. Since the action potential captures the central dynamics of the neuron, it would seem to be a good candidate. And in fact it may. But there are some difficulties in defining even a theoretical measure of it. Do we measure the potential voltage at the base of the axon, at the midpoint, or at the ends? 'Zero voltage' at any one point does not inform us about the potential at any other point, and so may be misrepresentative.

Furthermore, simply looking at the action potential tells us nothing about communication with other neurons. Neurons may be firing but other substances (like narcotics) may be blocking synaptic transmission. More importantly, phase space analysis does not discriminate whether or not the neurons are in communication at all. One could create a theoretical phase space picture of the instantaneous state of one billion neurons, but these could be configured as one single neuron in each of one billion people (resulting in an interesting variation on the 'Chinese nation' problem). In such a case the phase space picture would exist, but may be meaningless.

Thus it seems to me that a promising alternative is to consider the neurons at the point where they exchange energy with other neurons, and this is at the synapses. The synapse action captures both the effect of the action potential and the necessary interconnection between neurons. If we take as a state variable the '*synapse potential*', and allow this to vary between '+' (excitatory) and '-' (inhibitory) values, then we may reasonably claim to have captured the essential energy dynamics (though clearly not the total energy dynamics) of the brain. This approach has been suggested in the past (as I will elaborate), and I believe it to be the most promising.

This said, I emphasize that this is only one possible phase space approach. Others may well turn out to be superior. Certainly a strong case can be made that the only appropriate picture is that of the 'ultimate' phase space, that of the sub-atomic particles. Or, hybrid spaces combining aspects of the action potential and the synapse voltage may prove more useful. The particular definition of phase space is not important here. What matters is that *some* phase picture is conceivable, and that *every* such picture consists of a single point moving in a chaotic manner, bound by a strange attractor-like pattern. I would like to suggest that the possibility of alternative, equally-valid phase space representations may be seen as multiple ways of viewing the singular nature of the system. Each particular representation may be a certain *perspective* on the singularity.

The synapse is the point of exchange. We saw that this exchange is one of electrical energy, in the form of chemical ions. Functionally, it is the energy that is important, not the atoms *per se*. So what if we take the *synapse voltage* (defined as the potential difference across the synaptic cleft) as our primary state variable? In this case, we may consider the brain as a system of 100 trillion (10^{14}) synaptic voltages, each varying in response to the internal actions of the corresponding neurons.

What kind of phase space do we get? Each synapse voltage varies along a continuum, from some minimum to some maximum value. In phase space, this suggests *one dimension per synapse*, each representing the instantaneous voltage across it. Thus the brain may be seen as a system with a phase space of 100 trillion dimensions. Such a 'neural state space' model of the brain has been discussed in one form or another for more than 15 years, at least since Paul Chuchland's first articulation of it in 1986 (see Churchland, 1986). My initial presentation (Skrbina, 1994) offered some unique perspectives, all of which are elaborated upon in this thesis.

One of my novel interpretations is this: In this immense phase space of the brain there moves a single point, a point that accounts for the instantaneous state of every synapse in the brain. If we allow that the dynamics of the brain parallel the phenomenon that we call 'mind', and that mind is fundamentally a *unified* phenomenon, then we have a simple and elegant picture: *the point in phase space represents the unity of mind*.

Such a picture can help to answer a number of central problems in the philosophy of mind – unity of mind being perhaps the most obvious. From the perspective of the conventional materialist monism, with nothing but mass and energy to constitute the body and the brain, how can there arise, from only this, the feeling of singularity and unity? The 'unity of mind' or 'unity of consciousness' has been a major puzzle to philosophers of mind and neuro-physicists alike. Until now, they have been unable to devise an acceptable explanation. Phase space concepts, which are outside the bounds of most philosophical and physiological discourse, seem able to provide an answer.

The standard philosophical recourse has been either (a) to adopt a dualist position, in which 'mind' is seen as a non-physical or supernatural entity that can trivially be considered a unity, (b) to define mind or consciousness in sufficiently vague terms as a 'centrally unifying entity', or (c) to deny that the unity really exists. Recently Chalmers (1996) has addressed this issue of unity. In discussing aspects of conscious experience, he pointedly down-plays the unity of experience: "Like the sense of self, this unity sometimes seems illusory -- it is certainly harder to pin down than any specific experiences -- but there is a strong intuition that unity is there." (pp. 10-11) And he addresses it later when listing six basic "open questions" that any theory of consciousness must answer:

> [W]hat makes my visual experiences, auditory experiences, and so on, all experiences of the same subject? I suspect that the answer involves the way that the relevant information is processed, so that the unity of consciousness corresponds to the fact that relevant information is available to be integrated in a certain way. But just how to cash this out is unclear. (p. 309)

Like Churchland (1998), I propose that the "relevant information" is the synaptic voltage, and that this information is "integrated" by virtue of that fact that the brain is a highly interconnected feedback network which exhibits a strong sense of unity, a fact reflected in the singular point in phase space.

The equating of mind with the point in phase space is a very simple conjecture – some might say, audaciously simple. Obviously such a simple picture cannot account for all the complexities of mind, nor can it answer every conceivable metaphysical query. Be that as it may, I believe that it has much to offer in the way of explanatory power, and points to larger issues of mind and participation. Like any theory, it is necessarily incomplete; it is only a step on the way to a deeper understanding of ourselves and our world.

Finally, let me note that my conjecture has a certain important connection to the 'identity theory' of mind. This theory, as traditionally presented, argues that mental states are not independent or merely correlated to the brain, but rather are literally identical with the physical states of the brain. The identity theory is typically portrayed as a materialist monism that denies all non-physical existence to mentality and mind. Standard identity theory is limited in that it only ascribes mind to neural states as opposed to physical states in general (though this is not a requirement), and in that it leaves unexplained certain central characteristics like 'unity of consciousness' and qualia. Hylonoism claims, along with the identity theory, that (human) mental states are uniquely given by neural states; but it differs in that the basis for this view is seen in the dynamics of mass/energy, and as such applies to all physical systems. Furthermore, hylonoism is monistic but *non-materialist* in that it views the unity of mind as an eminently real phenomenon that does not reside, properly speaking, in the material world.

4) Recent History of Mind in Phase Space

I must reemphasize that I am not the first to propose using phase space concepts to help understand the issue of mind and brain. I take this as an encouraging sign. There have

been a number of related inquiries and studies in the past 25 years, and I want to take a moment to mention a few of the more relevant ones.
Perhaps the first indications came in 1977, when Edwin Land proposed a state-space theory of color perception, in the form of what may be called a 'color qualia cube' (Land, 1977) – something I address in more detail in the next section. Land did not refer to chaos theory, but he did make the first steps toward representing aspects of mind in *'state space'* (state space being a generalization of phase space). Not long thereafter, neuro-physiologists began to apply state space concepts directly to the brain. In the early 1980's Pellionisz and Llinas (1982) proposed state space models of sensory and motor function.

Then in an important 1986 article ("Some reductive strategies in cognitive neurobiology"), Paul Churchland elaborated on the philosophical implications of Pellionisz, Llinas, and Land's work, and articulated one of the first visions of mind in phase space. Churchland's central argument is that "the brain represents various aspects of reality by a *position* in a suitable *state space*" (1986: 280). By "position" he means the position of the single phase space point that I have been discussing. This main argument is an important development, and hints at a key element of hylonoism. Much of the article is taken in a discussion not of brain state spaces, but rather more abstract 'angular state spaces' that relate, in his example, visual input data to motor outputs. Churchland sees the brain as implementing a *transformation*, or mapping, between spaces – specific sensory inputs yielding specific motor outputs.

Near the end of the article, he addresses more directly a state space conception of the brain:

> The global state of any complex system composed of *n* distinct variables can be economically represented by a single point in an abstract *n*-dimensional state space. This state space as a whole can be neurally implemented...by a parallel set of only *n* distinct fibers. And a specific point within that space can be implemented by a specific distribution of *n* spiking frequencies... (p. 299)

This is very close to the basic view that I am arguing for. On the basis of this picture, Churchland suggests that Land's 'objective' color cube can be translated into an "internal qualia cube" (p. 301), with each axis of the 'mental state space' represented by "the instantaneous activity level or spiking frequency of one of the three [ocular] pathways" (ibid). He then cites examples that suggest that *all* sensory systems operate in a similar fashion, i.e. as a point in the appropriate state space.

Churchland is known for his defense of *materialist eliminativism* – that mind reduces to a material brain, and that folk notions of mental states are fundamentally mistaken. He takes his vision of mind in state space as a strong argument for this view. Thus one finds such materialist claims as: "the 'indescribable' olfactory sensation produced by a newly opened rose might be quite accurately described as a '95/33/10/80/60/55 chord' in some 6-D array within one's olfactory system." (p. 303) – where the numbers represent the coordinates of the point in state space (the 'rose scent point'). I interpret this state space vision of mind differently. To me, the unity of mind is an eminently real phenomenon, and the mental phase space is very much a part of reality. If this mental space (the Partimens) is real, then I conclude that materialism cannot be true. Material substance is not the basis of all reality, but only one aspect or dimension of it. This issue requires greater discussion, which I will give in subsequent chapters.

Furthermore, Churchland fails to explain what if anything is so unique about the *human* brain's state space that only it can experience qualia. In fact, he hints that other, non-human systems may experience qualitative, subjective, mind-like experience (see my comments below). But this is dangerously thin ice for a contemporary philosopher; the ever-present threat of panpsychism looms, which Churchland dodges and I embrace. He does, though, see great potential in the state space description of mind, suggesting even that "it [has] the resources to account for the so-called higher cognitive activities" (p. 305).

Notably, Churchland's 1986 article makes no mention of chaos theory. More surprisingly, he does not address it in *any* of his numerous discussions on neural state space since that time[8]. This is really quite astonishing, since chaos theory adds an important new dimension to the state space discussion.

Other thinkers advanced ideas surrounding mind and phase space. Lockwood (1989), for example, goes into the concept of phase space in some detail, but strangely drops the matter just as he is approaching the most important conclusions. He gets side-tracked on the issue of quantum mechanics and the related 'Hilbert space', and, like Churchland, fails to bring chaos theory into the discussion.

The early 1990's saw a significant expansion in the number of works on chaos and mind. Churchland and Churchland (1990) tackle the issue of artificial intelligence, this time using the techniques of neural networks. This leads them toward a more general conception of mind, including entertaining the possibilities that the 'Chinese nation' may actually function like a mind, and that there is "no principled reason" why intelligent machines could not be constructed. In the same year, Basar edited the book Chaos in Brain Function (1990) which included a number of important discussions. A year later, neurophysiologist Walter Freeman published an article in *Scientific American* (Freeman, 1991) giving clear evidence that the brain does in fact exhibit chaotic behavior. His 'phase portraits' of the olfactory system give an excellent picture of what one might envision as the movement of the point in phase space[9]. And he suggests that a kind of memory resides in the strange attractor patterns, allowing for rapid recall of previous sensory experiences. In 1992, Fodor and Lepore (1992) published one of the first philosophically critical works against Churchland's state space model; they focus more on the semantic and representational issues, asking how each individual (neural) axis in the state space gets its own semantic content from which to construct the larger content. They also argue that variations in structure of mapping and dimensionality between individuals should preclude any common understanding of the world. These are not insurmountable criticisms, and Churchland responds quite ably (see his 1998). Also in that year Churchland (1992) introduces the terminology of "activation space" for the state space of the brain, and of an "activation vector" that locates the point in that space. And as mentioned earlier, a number of other works were released (Kaufmann, 1993; Goertzel, 1993; Goerner, 1994), each elaborating on aspects of chaos and mind.

In 1993 I first publicly presented my own vision of chaos and mind, an early articulation of hylonoism. This occurred at the 13th World Conference of the World Futures Studies Federation (Turku, Finland), with the topic 'chaos and convergence'. Though philosophically undeveloped, my theory of *participatory chaos* captured for the first time several key elements, including (1) the first clear articulation of a neural phase space, (2) a new interpretation of attractors, (3) the identification of the phase point with the unity of mind, and (4) the panpsychic implications. See my (1994) for details.

The broader discussion continued with vigor into the latter half of the 1990's. Kelso and Fuchs (1995) consider chaos in brain activity as centrally important, but neglect to connect the phase space point itself with any real phenomena. Goertzel (1994) and Combs (1995) draw out some psychological implications of chaos and mind, and highlight some important connections between mind and attractors (more on this shortly). MacLennan (1996) touches on all the relevant issues, including reference to the synapses as determining brain state, non-deterministic behavior, and synapse action as 'protophenomenal', i.e. as something mental-like in itself – but again, he fails to pull the points together and draw a cohesive picture.

The Chuchlands return to the subject in 1997 and 1998. In their (1997) they continue the discussion of activation space (phase space of the brain) and argue (as I do) that this makes for a relatively straightforward explanation of the 'hard problem' of qualia. Interestingly, they cite "unity of consciousness" as one of the "much harder" problems – which overlooks the unity of the phase space point itself as an obvious candidate. As such, they are left without much of an answer to the unity problem; they conclude that the brain "can integrate information from different sensory modalities by delivering such information, directly or indirectly, back to a common cell population" (1997: 175-6). One might have hoped for a more clearly articulated conclusion.

Paul Churchland (1997) at the same time argues for a new conception of neural space, one very close to what I am presenting here. He proposes to use the *synapse* as the state variable. In doing so he replaces the terminology of an activation space with a "*synaptic weight space*". But again he stops short of the larger implications. Lastly, his

(1998) responds to the on-going criticisms of Fodor and Lepore. Here he returns to the activation space concept, and drops all reference to the synapses. He also explicitly speaks of a space with 'one dimension per neuron' – identical to my 1993 articulation of 'participatory chaos'. Chuchland spends much time discussing how to measure distances in state space. He cites research from the late 80's and late 90's, although similar calculations have been performed for decades in the field of information theory, where the 'Hamming distance' has long been used as a metric between points in state space. His lengthy analysis of simplistic feed-forward neural networks finally gives way to mention of more realistic "recurrent" (feedback) models; here we find "a new universe of subtleties". In these feedback models, he notes just in passing some important aspects of state space:

> [a feedback] network's primary unit of [semantic] representation is not the *point* in activation space, but rather the *trajectory* in activation space."
> (1998: 27)

He seems to sense some importance in this idea, but leaves much unsaid. As I see it, the notion of the trajectory is captured in the dynamics of a quasi-attractor pattern, as I explain in the next section. This is the closest Churchland comes to acknowledging the role that chaos theory can play in the understanding of mind.

Thus it is clear that many writers have explored the application of phase space and chaos theory to the problem of mind, with varying degrees of success. The link is undeniable to many, and I find it encouraging that a major philosophical figure like Churchland has found importance in it. But as much as has been offered, I believe there is much more to the story. As I have mentioned, no one yet seems to have made either the connection between 'point in phase space' and 'unity of mind', or drawn out the panpsychist implications that I first proposed in August of 1993. And one finds only the most fleeting glimpses of a connection to the ideas of participatory philosophy.

As I have noted, the unity of mind is a central philosophical issue. Dualists have (ostensibly) no problem with it, and monists have a big problem. The standard materialist monism has no satisfactory answer. Phase space approaches offer the most promising resolution, but it implies (at least) a dual-aspect ontology. Actually, I am skirting around some essential points here, and I will address these later. But I do want to briefly acknowledge Chalmers' point that a unitary consciousness sometimes seems illusory. In fact, I think there is good reason for this (as suggested in the preceding paragraph), and it follows from a fuller reading of my hylonoism theory. The essence of my view is that, from the perspective of the individual, the most complete unity of consciousness is that of the *entire body*, not just the brain. The brain is a dominating consciousness, but it is only one part of the whole. This discussion, however, breaks into new ground. It argues that something like 'consciousness' results not only from the brain, but also from all other *biological* systems, and even all other *physical* systems. This is contained in my theory of hylonoism, and I discuss it at length below.

5) Characteristics of the Point of Consciousness

The point in phase space clearly addresses the issue of unity. I take the unity of human experience as a reality, and the phase space model gives a simple and elegant account of why it exists. But we should be able to say more. If the model is a valid account of reality, it must demonstrate explanatory power in a number of areas, not just on the issue of unity. Let me mention here four important implications.

One, we may note that, as the brain moves through a succession of 'brain states', the point correspondingly moves through regions of phase space. Since the brain is a nonlinear feedback system, it likely exhibits chaos, and thus, *the path traveled by the point will be chaotic*. This means that its precise change through time is unpredictable in principle. No knowledge of neuron states, no information about sensory inputs or outputs, is sufficiently accurate to predict the brain's progression and overall state. Infinite accuracy would be required, and this is clearly impossible. The brain is like all dynamic systems -- chaotic and unpredictable in detail. This is, at least, consistent with our common sense view of human thought, and of human action. Thoughts and actions are not predictable in detail.

Two: However, we know that *there is a sense* in which thoughts and behavior are predictable, and this is through the concept of human *personality.* A personality is a quasi-stable entity. In people, it represents the range of typical and expected behavior. For most people, barring injury or severe disruption, it tends to be consistent over time, usually from childhood through old age.

The concept of personality corresponds very closely with the concept of the strange attractor. Recall the Lorenz attractor: a consistent, recognizable, semi-stable pattern, which, in a fuzzy sense, identifies the bounds of the possible states of the system. If the brain is seen as a chaotic system, accompanied by a quasi-attractor pattern in phase space, then a personality can be seen as a logical and necessary consequence.

This connection between mental states and strange attractors was first addressed independently by myself, Goertzel, and Combs; all emerged around 1993. In his (1994), Goertzel writes:

> The brain, like other extremely complex systems, is unpredictable in the level of detail but roughly predictable on the level of structure. This means that the dynamics of its physical variables display a strange attractor with a complex structure..." (p. 157)

In the same work Goertzel identifies a 'cognitive equation' as defining a grand attractor which encompasses a person's entire mental life. This is very close in spirit to my description in 1993. Combs develops this idea from a psychological standpoint. He writes, "Rather than viewing a state of consciousness simply as a system, let us also view it as an attractor. ... [S]tructures and states of consciousness are strange (chaotic) or chaotic-like attractors." (1995: 59, 61). For him, *each different state of consciousness is a different strange attractor.* This is an intriguing idea; it views the personality as a collection of strange attractors rather than (as I do) a single attractor entity. These are not incompatible views, and Combs' approach has the added benefit of suggesting a research program that may attempt to map out the various attractor patterns.

So: why do people have personalities? The answer seems the same as: why do real chaotic systems follow quasi-attractor patterns in phase space? The reason is related to the stability of the interconnected network over time. In the Lorenz model, the three equations are stable, even though the variables take on many different values. In the brain, the neurons generally establish long-term connections with their neighbors. The total number of neurons is maximal at birth, and they slowly die out as we age. The interconnections also appear to be near maximal at birth, although recent evidence indicates that new connections can occur under certain circumstances[10]. These two factors – the number of neural nodes, and the pattern of interconnections – are central to defining the nature of the quasi-attractor pattern, and hence, presumably, to personality.

What *does* change, as I have mentioned, is the 'weighting' of the synapses. This weighting acts as a barrier, a resistance, to the passage of energy through the brain. Frequent use reduces the resistance along certain paths, thus strengthening the interaction. It is reasonable to assume that the synaptic values at birth (i.e. those of the newly-developed neuron cells) are in some neutral, or perhaps even uniform, state – this owing to the similarity in human genetic processes that give rise to the neurons in the first place. In this sense, the infant brain is 'unprogrammed', or better, programmed genetically only for a few very specific tasks, such as maternal voice recognition, sucking instinct, and fear of falling. An empiricist could argue that this is the genetic *tabula rasa*, the 'blank slate' that infants can appear to be.

It is reasonable to claim that the variation in the weighting, then, changes not the overall personality pattern (which is determined by number of neurons and pattern of interconnection) but rather the path of movement within the fuzzy confines of the quasi-attractor. A change in the overall personality pattern would require either significant change to the structure of the neural interconnections, such as a loss of neurons or a severing of their connections, or the interruption of the communication flow in a significant way, such as through alterations in the neurotransmitter chemicals.

Let me emphasize: it can thus be seen that there are in fact *two unities* associated with a given chaotic system: the *focused unity of the instantaneous point in phase space*, and the *larger-scale, fuzzy unity of the quasi-attractor pattern.* We see strong first-hand evidence, namely, our own personal experience, of these unities in human beings. I believe we have good reason to seek them in all physical systems.

Three, this approach to mind and consciousness is clearly dependent on the connectionist structure of the brain. Connectionism, in the philosophy of mind, is generally seen as a functionalist account of mind, seeking to explain aspects of behavior and learning; it is also usually seen as opposed to the standard 'language-of-thought' model. Discussion of connectionist approaches to understanding the mind are often attacked as being 'merely functional', and as being unable to account for the deeper aspects of consciousness. Chalmers (1996) again provides a case in point:

> Even such "revolutionary" developments as the invocation of connectionist networks, [and] nonlinear dynamics...will provide only more powerful functional explanations. This may make for some very interesting cognitive science, but the mystery of consciousness will not be removed. ... Any account given in purely physical terms will suffer from the same problem. ... [I]t will yield only more structure and dynamics. (p. 121)

I have argued that at least *one* of the major mysteries, that of unity (in both aspects), can be accounted for. Churchland argues (and I concur) that *another* major mystery, that of qualia, can be resolved (see below). Furthermore, my approach offers new ways of addressing the issue of *causality* between mind and matter[11]. Chalmers' main concern with connectionism is that it is a reductionist/materialist approach to consciousness, and for a number of reasons he is convinced that any reductionist approach must fail. I think that his sense is right – materialist reductionism fails – but his fear is misplaced. A connectionist-based approach can yield a non-reductionist, non-materialist ontology. Let me note once again that the first piece of evidence for this is in the dual unities of phase space point and quasi-attractor -- they are real, yet non-physical. They reside

nowhere in space-time, yet they exist. This fact points toward a variation of non-reductive monism – what I earlier referred to as a naturalistic dual-aspect view.
Four: The chief mystery that Chalmers is referring to above is that of *qualia*, or the qualitative feel of different mental states. This is his "hard problem" of consciousness -- why does a given mental state feel the way it does, or feel like anything at all? This is certainly a valid complaint; most every theory of mind offered up so far fails to explain why an 'inner experience' must exist, not to mention how and why it feels as it does.

My account above offers some new approaches to qualia. The point of consciousness reflects the instantaneous state of every synapse. In the brain's phase space, every synapse is associated with one dimension, which can be thought of as one 'axis' in a 100-trillion-axis space. When confronted with, say, a field of red, certain (thousands) of neurons in the primary visual projection area are stimulated in a specific and unique way. This stimulation results in the point of consciousness moving into a certain specific region of phase space, one that we might call the 'red region'. When in this region, we 'feel redness'. A red 'quale' is, *by definition*, the state of being one finds oneself in when in the red region of phase space. It 'feels' unique only because we are able to distinguish it from other regions, such blue, green, and so on.

In one sense, this is very close to the 'retinex' theory of color perception proposed by Land (see his 1977). The various colors are assigned unique points in a state space, based not on brain parameters like synaptic potential, but on the 'brightness' of each of three wavelength responses that the cells in the eye are tuned to. This model results in a 'color qualia cube' – see Figure 1.

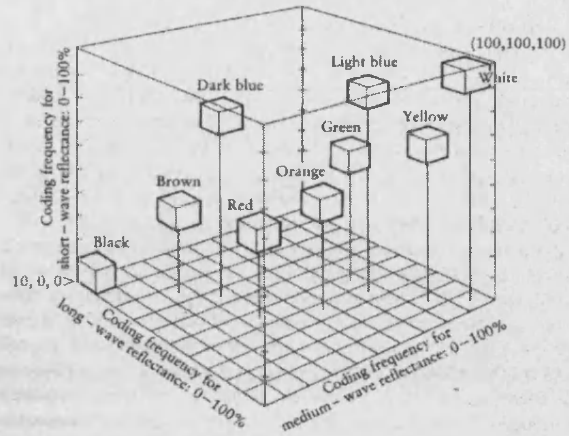

Figure 1 – Edwin Land's 'color qualia cube'

But Land focuses on external, measurable quantities (for good reasons), rather than the more inaccessible state variables of the brain. A more general theory of mind would argue that (a) we cannot describe the complexity of color perception with only three variables, and (b) color is not unique, but rather *all* perceptions might fit into a similar phase space description, with the appropriate state variables.

Because all the dimensions of phase space are mutually orthogonal (perpendicular), other feelings, sensory or otherwise, may co-exist with our feeling of redness. The tactile projection neurons may indicate 'pain in left elbow' at the same time that the visual neurons are indicating 'red'. The phase space point then moves to a different region of 'red', a region that intersects with the 'pain in left elbow' region. Thus both are 'felt' at once. Phase space of the brain is almost unimaginably vast, and can reflect all different combinations of sensory perceptions that we may experience.

As to why there is a 'feeling' associated with different regions of phase space, I would suggest that this is a result of our evolutionary heritage. As the point of consciousness moves through different regions of phase space, the human organism distinguishes different states of being, and the mode through which we distinguish this difference is what we call 'feeling'. We humans notice different (phenomenal) feelings for two reasons: one, because of the varied nature of our sensory organs, and two, because different perceptions have different levels of meaning and urgency. The difference, and the quality of the difference, has been honed over millions of years -- the smell of ripe fruit, the sight of a tiger, the feeling of pain, the sound of a baby's cry, all have varying levels of meaning and importance with respect to one's propensity for survival and well-being. The range and sensitivity of our eyes, ears, skin, and so on have increased over the eons of time, and varying levels of sensitivity are reflected in our ability to detect increasingly subtle variation within the brain's phase space. And of course, the phase space itself has grown in dimensionality as the brain has increased its neuronal count. But the main point is that the human organism has found it necessary to detect ever more subtle inputs from the environment, and this is ability is made manifest in what we call a qualitative 'feeling'.

If the existence of qualia is an evolutionary fact of human nature, then this offers a resolution to the philosophical arguments surrounding 'zombies'. A philosophical zombie is a being who is exactly like us in every way except that he lacks 'inner experience', i.e. qualia. Functionally a zombie would supposedly walk and talk just like a real person, but all his activity would be unaccompanied by subjective experience. In my conception, the philosophical zombie is both naturally and logically *impossible*: human physical make-up, and in particular a brain composed of human neurons, necessarily implies human-like qualia.

6) Hylonoism, Information, and Mind-Brain

Let me reiterate: I believe that the picture given to us by phase space analysis is essentially correct, and that it has significant philosophical implications. Classically, this analysis was performed on moving masses. More generally, it applies to the movement of mass-energy. Dynamic systems of mass-energy are describable by the trajectory of a single point in phase space. For the human brain I have argued that this corresponds to our unity of consciousness. Let me now begin to further develop this theory, which has as a logical consequence the feature that all dynamic systems of matter co-exist with mind.

All physical systems are describable in terms of a single point moving in phase space. This much is clear, and is widely accepted. Hylonoism is the conjecture that this point can be identified with a noetic unity of the system. Certain characteristics of this point are completely general, and apply equally well to the human brain as to any physical system – including chaotic behavior, personality, qualia, and so on. This idea of 'phase space point as noetic unity' requires a new, less cumbersome name; following the terminology of hylonoism, I will refer to the point in phase space as the *hylon.* As for phase space itself, I consider it not merely a theoretical 'space' but rather a very real aspect of the world; I will refer to this space as the *hylosphere*[12]. Thus, the hylosphere becomes the realm of mind for a given system. Each physical system maps out its own particular hylosphere as a subspace of the larger realm of the Partimens. The hylon — the unity point of mind — moves within the hylosphere, in a manner described by chaos[13]. For persistent dynamic systems, the hylon traces out a fuzzy, semi-stable pattern in the hylosphere; this pattern takes the form of a quasi-attractor, and represents the 'personality' of the system.

Earlier I looked at the dynamics of the brain. With the new terminology I can state that the hylon moves continuously in the trillion-dimensional hylosphere, yielding different 'feelings' or 'moods' or 'impressions' corresponding to which region it is in. The hylosphere is as vast and wide as the complexity of the corresponding physical system. Qualia can be defined as 'region of the hylosphere'. Each region represents a different set of neural states, and hence will 'feel' different to the subject. Not every region, or every possible state, can necessarily be uniquely felt. But I submit that most of the vast number of regions of the hylosphere have a distinctive, 'subjective' feel to them. Evolution has ensured that living organisms are quite capable of distinguishing 'hot' physical states from 'cold', 'hungry' from 'satiated', or 'face of a stranger' from 'face of a friend'. Such a concept of 'hylonoetic qualia' can perhaps serve as the first step toward a noetic 'science of quality' (cf. Goodwin, 1999a, 1999b, 2000).

Of course, energy flow occurs not only *within* the brain, but between the brain (and body) and the external world. The energy exchange between the brain and the external environment has an intimate relationship to the concept of *information.* Energy exchanged is used and interpreted in a particular way. Depending on the nature and magnitude of the energy coming in, the brain reacts in a specific physiological manner, which in turn results in the hylon moving to a specific region of the hylosphere. Photons of a certain frequency hitting the rods and cones of the eye cause very specific neurons in the brain to fire, putting it in a unique region of the hylosphere; the effect is that the person 'feels' the impression of that particular input, which he associates with the concept of 'color'. (Recall that the 'color' region of the hylosphere is independent of all the other sensory regions, so that one can be simultaneously in the 'red', 'loud', 'itching', 'hungry', and 'smells like a rose' regions; these are independent, because certain unique groups of cells input cells are firing in each case. But the feeling is integrated into a single unity, because these cells are ultimately all interconnected.)

Thus described, *information consists of a particular reaction to received input of energy.* Depending on how the energy enters my brain, I react or interpret the energy in a unique way. A laser beam directed at my hand has a much different effect than one directed at my eye. Thus, the information content differs. My brain, being a highly-chaotic system, is very sensitive to inputs of energy. My brain-hylon (brain state) rapidly reacts to all inputs in my sensory field. The feeling that results varies depending how poised I am to a particular input. The total sensory input, combined with the effect on the total synaptic memory, determines how I feel and react; this is the definition of information as *interpretation of received energy.*

Such a definition is similar in spirit to Bateson's definition of information as "the difference that makes a difference" (Bateson, 1972: 453). He uses the phrase somewhat whimsically and imprecisely, whereas I have attempted a very specific and well-defined meaning.

7) Cell-Based, Biological Mind

The overall picture of the brain, then, is one in which a vast network of interconnected cells exchanges mass-energy, both amongst themselves and with the outside world. Neural cells are unique in that they exchange energy primarily (for functional purposes) in the form of electricity. Other cells of the body are less specialized. They exchange energy, but mostly in the usual metabolic form of nutrients and wastes. Clearly, for example, skin cells must exchange *something*, or else they could not cohere. A tension or pressure on one cell gets passed along to all surrounding cells, which in turn pass it on to their neighbors. Energy, in the form of 'force', is transferred from cell to cell. In addition to forces, chemicals continually move in and out of cells. Different cells react differently to forces, and exchange different types of chemicals. The brain is unique in the type and speed of energy exchange, but not different from the other organs in that it is a system of interconnected cells that continually exchange mass and energy.

The concept of the hylon applies to any and all systems of mass-energy. The classical picture of a cluster of moving masses is easily generalized to cover the movement of particles of mass-energy. In one sense, the brain is unique because of its high-speed, highly interconnected, highly chaotic system nature; in another sense, it is like all other organs — they all are networks of cells exchanging energy. Their dynamics may be different, but they share in the ability to be fully described by a point in phase space.

Each organ, then, maps out its own hylosphere in which moves a hylon point representing the noetic unity of that organ. Every organ 'feels', experiences qualia, and possesses a personality.

The hylons of the other organs react in their own way, dependent upon their structure of interconnection, speed of exchange, and form of exchange. They receive energy directly from the external world, or via nerves connecting to the brain or other organs. The flow of energy through each organ leaves it mark; there is an element of memory to every organ. Professional athletes know this well: the body remembers its blows, stresses, pains, and bruises. Memories are stored not in synapses, but, in an analogous way, in the physiological structure of the organ (as well as, of course, in the synapses of the brain — if for example one experiences a memorable injury). *Every material object notes the passage of time, each in its own unique way.* Organs are no exception. This is confirmed by our knowledge of the hylon, which alters its path through the hylosphere based on each and every quanta of energy that it experiences.

A given organ consists of several types of cells, reflecting the different tissues; these may include epithelial, connective, muscular, or nerve cells. And the various tissue cells merge into other organs, forming a fuzzy boundary that delineates the organ. Nonetheless, we can identify a variety of structures within the body. Most cells clearly belong to a given organ or structure, and hence contribute strongly to that particular hylon. Many cells exist on the fuzzy boundary between structures of the body, and these, therefore, participate strongly in *multiple* hylons.

It could be argued that because cells are not always clearly assigned to a given organ, this implies that the concept of a hylon is ill-defined. On the contrary, this is an essential aspect of the theory. Sub-structures such as cells are not rigidly assigned to particular systems but participate in varying degrees with a variety of structures within the body. It is typical that one particular system dominates a cell's interactions, and thus we say that the neuron 'belongs' to the brain. But if a neuron releases peptide neurotransmitters that act on another organ of the body, then it clearly has an element of participation in that organ as well. And every cell interacts via the bloodstream with all parts of the body.

Each organ has a unique personality, the pattern of its quasi-attractor, which we can sense when we interact with it, consciously or unconsciously. Yet clearly the brain *is* different. The brain excels over the other organs in at least five ways: First, there is the *speed* of communication. The electrical signal moves at up to 100 m/s along the axon, versus the slow rate of chemical exchange that occurs between non-neural cells. Neurons have a highly-articulated *memory*, in the way the synapses elastically change over time, recording the patterns of energy flow. Also, the *degree of interconnection* is significantly higher for brain cells that for other cells. Neurons interact with up to 10,000 other cells; non-neural cells have perhaps 5-10 neighboring cells with whom they communicate directly. And, neurons perform a simple but crucial act of *processing* when they integrate (i.e. sum up) the incoming voltage pulses. Fifth, one form of energy — the electrical pulse — dominates its energy dynamics, versus a typical cell that may exchange many forms of energy.

In concluding this section, let me add that it is not only an organ that possesses its own hylon, but also *every part* of the body that exists as a subsystem of the whole. Consider an arm or a leg. Each is composed of a variety of sub-structures: organs, bones, cells, fluids, and so on. These sub-structures, each possessing their own hylons, jointly participate to form higher-order hylons. This inter-structure exchange forms the basis for higher-level hylon of the whole limb. Corresponding with this limb-hylon and its quasi-attractor pattern in the hylosphere, we have the 'personality' of the limb, comprising all of its visible and felt characteristics — appearance, strength, sensitivity, size, etc.

All this perhaps seems implausible at first glance. Historically, though, other thinkers have come to a similar conclusion. Leibniz saw the changes and movement of the individual organs as contributing to the overall condition of the soul: "I even maintain that something happens in the soul corresponding to the circulation of the blood and to every internal movement of the viscera, although one is unaware of such happenings..." (1704: 116). Denis Diderot put forth the idea that each organ experiences 'sensations'; "In all seriousness, [I] believe that the foot, the hand, the thigh, the belly, the stomach, the chest, the lungs, the heart, have their own particular sensations..." (1769: 85). William James observed and noted this same fact about the human body. In the midst of developing his panpsychist theory of reality, James recognized that the parts of the body have experiences "for themselves". To use his example: instead of speaking of an arm-hylon, he referred to "arm-feelings". He wrote, "My arm-feelings can be, though unnoticed [by me]. They can also be noticed, and cooperate with my eye-feelings in a total consciousness of 'my arm'." (Perry, 1935: 765, vol. 2). This is exactly my point — that the singular experiences of each limb or each organ (A) exist for themselves, and (B) interact to form a higher-order mind.

8) Layers of Mind

So what of the body as a whole? The only logical and consistent conclusion is that the total mind of the body consists of *layers of mind*, represented by the various levels of organization within the body. The body can be considered as organized on differing levels, and correspondingly, *mind is also organized on different levels*. Nietzsche (1886) expressed this insight; he said, "*unser Leib ist ja nur ein Gesellschaftsbau vieler Seelen*" – "our body is only a social structure composed of many minds" (sec. 19, my translation).

Let us begin at the bottom. Consider the atoms within the body. These atoms consist of protons, neutrons, and electrons, and their corresponding field particles. The protons, neutrons, and electrons form quasi-stable patterns that we call atoms, and they do this by exchanging particles of energy (the field particles). The atom thus consists of a swarm of particles — mass-type and force-type — in a dynamic relation. The energies of theses particles form the basis for a *hylon of the atom*, a single point in phase space that represents the current total energy state of the atom. The hylon is a singularity, corresponding to the fact that the atom is, in some sense, a singular thing whose existence stands out against the background 'noise' of the surrounding flux of mass-energy. If the particles of energy that composed the atom did not stand out, did not make themselves known as a unity, it would not be a single 'thing'. The interaction among the atom's particles of energy are clearly stronger than their interaction with other neighboring particles of energy, and this gives the atom its existence.

Atoms interact to form molecules. They 'stick together', either by sharing an electron (covalent bonding) or by strength of electrical attraction (ionic bonding). In either case, energy is exchanged. The fact that molecules exist and persist is evidence of a strength and durability of interaction among the atoms, a unique pattern of energy exchange. The exchange of energy between atoms forms the basis for a *hylon of the molecule*.

The molecular structure has alternate expressions. We could consider it only a collection of protons, neutrons, and electrons, and leave the atoms out of the picture. Thus the molecular hylon has both a single sub-atomic hylon (based on the protons, neutrons, electrons, and force particles), and simultaneously, and some discrete number of atomic hylons.

Consider a salt molecule, for example. It consists of one atom of chlorine, and one atom of sodium. The chlorine atom has 17 protons, 17 electrons, and 18 neutrons. The sodium atom is 11 protons, 11 electrons, and 12 neutrons. There exists a 'chlorine hylon', based on its 52 sub-atomic particles (plus corresponding force particles), and likewise there exists a 'sodium hylon' based on its 34 particles. The salt molecule has a total hylon composed of both its sub-structures: as '86 sub-atomic particles' and as 'two atoms'. We may say that it is the simultaneous superposition of lower-level hylons that compose the high-level molecular hylon.

Why make a distinction? Why regard this as a two-level hylon? Why not ignore the atomic structure, and just consider salt as composed of 86 sub-particles? Because the pattern of interaction requires it. Compare a molecule of salt to an atom of nickel isotope[14]. Nickel has 28 protons, 28 electrons, and 30 neutrons — 86 particles, identical to that of a salt molecule. But clearly salt is different than nickel. It interacts differently, it exchanges energy differently with surrounding atoms. In the presence of water, for example, salt dissociates into a sodium ion plus a chlorine ion; nickel does nothing like this. The reason for this is clear: the atomic sub-structure of salt, i.e. the fact that the 86 particles are in one configuration (namely, two discrete atoms) rather than another. Salt is a 'pattern of patterns', whereas nickel is merely a 'pattern'.

This line of reasoning may be extended upward to the higher levels of complexity. Molecules interact to form compounds, or solutions, or even simple organisms. Molecules can only interact by exchanging particles of force/energy. A compound may therefore have a 3-tier hylon: one from the molecules interacting, a second from the numerous atoms, and a third from the sub-atomic particles[15].

Consider a single-celled organism. It consists of a number of sub-structures in the cell body, surrounded by some enclosing membrane (also a sub-structure). These sub-structures have their own identities and hence their own hylons (otherwise, we would not recognize them as independently-existing structures). At the highest level, the cell has a hylon based on the exchanges between these sub-structures, but it also has one based on the molecular, atomic, and sub-atomic interactions. The top level hylon is a function of the *total mass-energy configuration* within it.

Organs composed of a variety of cell types have a yet higher-level hylon, with the highest level a function of the interaction between cells. The total hylon of the organ is determined by all the sub-structures, plus all mass-energy that enters its realm of influence. Invading microbes, food particles, bits of waste, all become elements of the total hylon. An obvious question arises: At what point does something 'enter the realm of influence' and become integrated into the total hylon? The answer: *degree of integration depends upon the degree of participation.* The degree of participation is a function of the level of exchange; high levels of exchange = strong participation = high integration into the hylon. At the atomic level, atoms exchange either photons (of electric force) or electrons, and thus 'participate' in a very restricted sense; many photons/electrons means strong participation, few photons/electrons means weak participation. More complex structures can exchange more complex forms of mass and energy, and thus have more complex levels of participation.

Degree of participation is a relative concept. The sodium atom in a molecule of salt exchanges many photons of electrical force with its partner chlorine atom, but it also exchanges force particles with other nearby chlorine atoms. To the degree that it does exchange with other chlorine atoms, it does in fact enter into the total hylon of other nearby molecules. But of course, this is much weaker than the participation with its immediate partner.

Consider a large-scale system, like the sun and its nine planets. We know that the solar system has a phase space description (many, actually) that describes its changing state with the trajectory of a single point. As before, I suggest that we correlate this theoretical unity with a real, noetic unity. I thus claim that the solar system as a whole has noetic singularity, a total mind, given by the instantaneous energy state of its constituents. Each planet exchanges gravitons with each other and with the sun, and this is the dominant mode of interaction. (Though of course not the *only* mode of interaction. The sun gives off photons and other high-energy particles that contribute to its total being. But the dominant force, from a 'universal perspective', is that of gravitation.)

Then step down to the planetary level. Each planetary subsystem – defined as 'planet plus its moons' – has its own hylon, based again primarily on their mutual exchange of gravitons. Step down one more level. Each planet individually, and each moon individually, have their own hylons; these are based on the movement of mass-energy in the realm of influence of the planet or moon — primarily, the structures and movements of mass-energy on and within the planet.

The hylon of the solar system is determined by the relative amounts and distribution of mass-energy within it. Obviously the sun is the most massive, contains the most energy, and thus dominates the hylon. In one sense, 'from afar', the sun virtually *is* the solar system. From our local perspective, the planets contribute somewhat more strongly, more so for the largest planets, less so for the minor ones. The 'earth-moon' subsystem hylon is naturally dominated by the earth, the moon, and the gravitons they exchange; but gravitons from the sun and other planets, and photons as well, impinge on the system, contributing energy and thus to a degree affecting the total hylon.

Since all possible configurations of physical structures have a phase-space description, this implies that *all possible configurations of bodies possess their own hylon.* It is not just the 'solar system', or 'planetary subsystem' that are described this way, but every relationship individually as well. The *'earth-sun system'* has a unique hylon, given primarily by the exchange of gravitons between the two bodies. That the earth and the sun possess a collective hylon is merely to say that they stand in a relationship to one another, they interact, and they participate. This hylon, this relationship, is also affected by the moon and the other planets. The moon's orbit around the earth causes the earth to sweep out a wobbly path through space, thus affecting the gravitational force between earth and sun. The other planets participate weakly, but could conceivably interact strongly if their path was altered. We saw earlier that chaotic motion of the planets could (and may actually have) caused planets to go into highly eccentric orbits around the sun, and perhaps even being ejected out of the solar system. Such a strong input of energy, a strong form of participation, would clearly alter the entire structure of the sun-planet hylon. Rather than simply altering the path of the hylon through the hylosphere (the ordinary case), a strong interaction/exchange could cause fundamental restructuring. The quasi-attractor pattern in the hylosphere may change radically; it may become a 'new personality', perhaps one that fades into virtual nonexistence.

* * * * *

This discussion relates to the notion of *emergence of mind.* I have argued that degree of participation is determined by degree of interaction, and furthermore that intensity of mind depends on degree of participation. As intensity of interaction varies, so does intensity of mind. Mind thus is seen as 'emerging' from a system as participation increases, and 'de-emerging' as it subsides. This concept addresses the important philosophical problem of how, and in what sense, mind came to exist in the universe.

A hylonoetic interpretation of chaos theory thus implies two senses of emergence: *qualitative*, and *participatory*. 'Qualitative emergence' arises from the nature of chaotic systems. The nature of a strange attractor is such that it passes through an infinitely large number of states, never exactly repeating itself. As the hylon point moves through phase space, it likewise follows a non-repeating trajectory, never passing through identical mental states. In this sense, *mind is always new*. Mind is always in the process of change-without-repetition, i.e. in the process of *becoming*. It continually achieves new states, new experiences, new 'feelings'.

'Participatory emergence' is a recognition that the various types of physical being have passed from a state of non-existence into existence over some given period of time. At one point in the distant past neither people, oak trees, rocks, nor the Earth existed per se, and now they do; they represented new forms of participations between the energy quanta that was present in the universe. Correspondingly, their noetic systems grew in intensity and distinctness as they evolved.

As quanta of energy, or any system of objects, come to interact more strongly, the corresponding system of mind grows in intensity. This change is reflected in the phase space picture by the fact that more particles of exchange are represented in the system. Consider a simple example. A pile of sand on the table in front of me is a 'unity'. Its grains interact strongly, exchanging electromagnetic photons of force, particularly between grains that are in direct contact. The system is definable by the state of every quanta of energy in some very high dimensional phase space. At the 'top level', it can be described by a space with one dimension per grain -- this is the level that is immediately apparent to us.

The pile of sand can be represented by a hylon, a noetic unity. The point in phase space moves as the energy state of the pile changes. A 'stationary' pile would have a distinctive attractor personality. At the 'top level', all the grain velocities would be essentially zero, resulting in a nearly stable point. At the 'total level', though, forces are continually interchanged, and hence the total hylon moves with a distinctive pattern.

If we add grains to the pile, the phase space expands in dimensionality, and the personality pattern responds accordingly. Under certain conditions, a growing sand pile can reach a 'critical' state (cf. Bak and Chen, 1991), poised on the edge of a series of mini-avalanches. One can imagine a gradual change in the total attractor pattern, as forces build up to a critical configuration (recall my discussion of the pendulum with energy added to it -- Chapter 2). As an avalanche occurs, forces are realigned, ending in a new and more stable configuration, both physically and in phase space.

Now if we vibrate the table and cause the pile to disperse, both the 'top level' and the 'total' phase space patterns respond accordingly. If we stop vibrating momentarily at the point just when the grains cease to physically touch, we no longer have a 'pile', but we still certainly have a 'system of grains'. The 'top level' pattern again would be a mere stationary point -- *indistinguishable from the 'pile'*. The 'total level' pattern, though, would be clearly different: relatively very little force exchanged, low dimensional phase space, low intensity mind -- clearly different than the pile. Mind has devolved, or 'de-emerged'.

Finally, scatter the grains across the room. Mind diffuses to an extremely low level, completely imperceptible to us. We no longer see a 'system of grains', perhaps we don't see even a single grain. Yet the phase space description persists. The inter-grain exchanges are almost, but not completely, zero. The mind of the collective still exists, but has been totally subsumed by the background configurations of other pieces of matter.

Emergence of mind, in the participatory sense, is thus not a question of 'coming into being', but rather of 'growing intensity', of becoming apparent, perceptible. Such emergence occurs both in strength of interaction, and complexity of interaction. Intensity relates to the concept of *potenza* that I will describe in Chapter 8; greater interactions among greater numbers yields something of relatively great *potenza*, or intensity. As the *potenza* waxes and wanes, the corresponding mind emerges or devolves.

* * * * *

Let me close this section by returning to the world of ordinary objects. All objects around us — a pencil, a cup, a table, a house, a cat, a person — possess their own unique and individual hylons. Each hylon is a complex superposition of sub-hylons, based on the sub-structures of mass and energy that exist within the object. These are the 'layers of mind' that all things possess.

A human being consists of total hylon organized at several levels: the level of organ-interaction, of each organ in itself, of the cells of the body collectively, of the molecules of the body collectively, of the atoms of the body collectively, and of the sub-atomic particles of the body collectively. The body as whole has this total 'mind', this noetic unity. Again, this is not an entirely new position. Recall Leibniz's quote in the preceding section, that every change in the organs contributes something to the total soul of the body. Merleau-Ponty developed a phenomenology of the body that incorporated a similar insight: "[P]erceiving as we do with our body, the body is a *natural self* and, as it were, the *subject of perception*." (1945: 206; my italics).

We can sense this, intuitively, when we interact with another person. When we meet someone, especially for the first time, I claim that this total mind is in fact what appears to us as our 'immediate impression'. We see, hear, smell this person in front of us. We notice his or her size, shape, color, stance. But we know it *as a whole*, as a unified person. Only when we begin to interact, to participate with this person do we focus on the details, on the particular elements and subtleties of his or her persona. We begin to know their 'brain-mind', acting as it does as the coordinating center of interaction. Or, perhaps we interact 'physically' (as in sport), thus coming to know their 'body-mind'.

But our first impression, I claim, prior to all intellectualization, is a comprehension of the total hylon. It is not something known empirically. It is a kind of direct intuition, of one mind encountering another, and perhaps more: of two participating in a temporal unity, of an act of union resulting in the creation of a newly-intense system of participation, with its own noetic unity. A coming-together of minds results in each knowing the other directly and intuitive, non-empirically, through a form of mental unification and emergence. Hylonoism supplements this intuitive mode of knowledge by providing a rational foundation. Knowledge of other minds is thus both rational and intuitive, but not empirical.

This concept of grasping initially the total hylon is very near to something that Heidegger has discussed and analyzed. In Being and Time (1953), he attempts a fundamental examination of the nature of 'being'. In Chapter 3 of Division I ("The Worldliness of the World"), Heidegger is exploring the ontological meaning of value, which, for material objects, he discusses in terms of 'usefulness' (*verwendenheit*) and 'handiness' (*zuhandenheit*). He notes that useful things are not useful in themselves, but only in respect to other things -- as a nail is useful only in respect to a hammer: "[U]seful things are always *in terms of* their belonging to other useful things: writing materials [to] pen, [to] ink, [to] paper, ..." and so on. (p. 64). What is important is the *relationship* between such objects, and the fact that this relationship is of a *unity*. He continues:

> These "things" never show themselves initially by themselves, in order then to fill out a room as a sum of real things. What we encounter as nearest to us, although we do not grasp it thematically, is *the room*, not as what is "between four walls" in a geometrical, spatial sense, but rather as material for living. ... A *totality* of useful things is always already discovered *before* the individual useful thing. (ibid, first two italics mine)

Thus, when one enters a room, one grasps initially, intuitively, the room as a whole, and only then do we intellectually dissect it into a collection of objects. The web of relationships of the objects in it form the total unity of the room. The physical placement of objects, and their relative location to the floors and walls, is determined by exchanges of energy between these objects, and the mass/energy of the objects themselves. This total energy state of a room, for example, is given by the total hylon. Whether the objects are stationary or moving, their weight, color, shape, and so on are all elements of the total configuration of energy that makes the room a unique and singular entity.

Returning finally to the brain: The brain, as I have argued, is unique among the bodily organs, for at least five reasons stated previously — speed, memory, degree of internal interconnection, neural processing ability, and predominant exchange of electricity. This makes the 'mind' of the brain — its hylon — unique among all organs. It is more dynamic, more complex, than any other sub-structure of the body. The brain hylon dominates the total body hylon, but does not uniquely comprise it. In other words, brain is not equal to (total) mind, but is a dominating aspect of it.

The ancient Stoics had a term for the 'dominating part' of someone's soul; they called it the *hegemonikon*. It was the central point of interaction, the coordinator of activity. In the human body, they believed that the heart was the *hegemonikon*. Cleanthes claimed that the sun was the *hegemonikon* of the cosmos — very close in spirit to my depiction of the sun as leading element of the solar-system-hylon. I claim that the brain is the *hegemonikon* of the total mind of the body, and is a mind in itself.

The human body is, in a very real sense, a singularity. There is a oneness about it, a oneness we can feel but yet not point to. But the oneness is not absolute. Elements of our surroundings affect us in varying ways, blurring the boundary of ourselves, causing that which we call our mind to have fuzzy edges that blend into the world around us. We each are one, and simultaneously we are part of the whole environment. As we interact and participate, we become more integrated into the larger hylons that exist around us — whether it is that of our family, our circle of friends, the natural world, or even the universe. Endless layers of mind exist around us. Thus we have a new way of conceiving mind as permeating the universe.

9) Explanation versus Description

I have outlined a theory of mind based on the energy dynamics of the human brain, one that I have called the hylonoetic model of mind. I claim that this model, in which a point of consciousness moves continuously within the phase space of the brain, offers a major new approach to issues of mind and consciousness. But what is the deeper significance of this approach? Does it 'explain' mind, does it 'describe' mind, or does it rather do something else altogether?

First, let me again make clear some points about what is being offered here. The method of analyzing physical systems with phase space techniques is indisputable. As Penrose informs us, this approach applies to any and all systems in the universe, including the human brain, a star, or the cosmos as a whole. In his 1995 book Dynamic Patterns, Kelso has already applied such techniques to the brain, and has found various modes of chaos in brain activity. This chaos, he argues, serves the human organism in its need to interact with a complex environment. He writes:

> [T]he brain is intrinsically chaotic, possessing, by definition, an infinite number of unstable periodic orbits. ... [W]hen a cognitive, emotional, or environmental demand is made on the organism, an appropriate orbit or sequence of orbits is selected and then stabilized through a kind of chaotic synchronization mechanism. (1995: 284)

Kelso has included simple EEG sketches of the brain's movement through phase space[16]. Cognizant of this radically new approach to understanding the brain, he is adamant that his technique is on solid scientific footing; "the facts presented here cannot be denied" (p. 285). He does not, however, identify the point in phase space with the unity of consciousness, nor does he develop the philosophical implications.

With respect to the usage of phase space as an analytic tool, I suggest that it can be viewed as a mathematical description of a physical process, one that I would liken to Newton's equation of gravitational force ($F=GmM/R^2$). Newton, of course, did not 'discover' gravity, but he did articulate its nature in quantitative form. His equation describes the gravitational force, and when combined with modern vector notation, describes the 'gravitational field'. But Newton did nothing to 'explain' gravity. He proposed that certain phenomena (falling objects, tides, planetary motion) could best be generalized and described by presuming the existence of a certain universal entity called 'gravity' that acted according to a certain regularity of strength (proportional to 'mass') and of distance (inverse-square law). In hylonoism I am proposing that a certain phenomena, mind, can be generalized and described by presuming the existence of a universal entity called 'mind' that acts according to a certain regularity described by nonlinear dynamics. Gravity theory had certain implications – all mass 'has' gravity – and hylonoism too has certain implications – all systems 'have' mind. I am not offering to explain why this is so, just as Newton did not explain why gravity exists, other than naming it as a subtle fact about matter.

Later developments have made progress in understanding gravity, including the concepts of gravitational radiation (gravitons), and gravity as curvature in space-time.

Still, these things only offer better descriptions; the 'why' of gravity's existence remains as mysterious as in the time of Galileo, or Plato.

Thus I offer up my hylonoetic theory as a *description* of mind, but one that allows us to make important new inferences about systems in general. And I take the existence of the point in phase space, and its identification with the unity of consciousness, as core facts of nature. That this unity is accompanied by human-like qualia I take as an evolutionary fact of the human species; the specific qualia we feel are related to both the type of sensory input and to the significance of that input.

I have pointed to the many correspondences between what phase space analysis has to say about dynamic systems, and what I take as core facts of human experience. With some qualifications, I take the unity of consciousness to be a real and central phenomena; as such, it is imperative that any model of mind account for it. I take the quasi-unity of the 'personality' to be a real phenomena, also in need of adequate explanation. I take the brain as deterministic, wholly physical system, one that defies detailed theoretical or practical predictability. I take the indisputable connectionist structure of the physical brain as being central to its operation, thus demanding a connectionist theory of mind (under the assumption that brain activity plays a central role in the process of mind).

It seems to me that these correlations between the properties of the point in phase and the unity of consciousness are too strong to disregard. But neither can I prove that they are equivalent, or that they must be equivalent. *This equivalency I take as an irreducible yet subtle fact of nature*. Those who might dismiss it as 'coincidental' overlook a promising and potentially revolutionary new approach to mind.

The hylonoetic theory offers a rational, naturalistic account of all these issues. Simply consider the parallels between the point in phase space and the 'point-like' unity of our own consciousness; between 'personality' and the quasi-stable form of a virtual attractor. *These parallels are too striking not to be taken seriously as indicative of* *something important.* It cannot be purely coincidental. There must a deeper connection – a deep description of consciousness that is found in this analysis.

I suspect that some philosophers and other thinkers must have come to this point of understanding, but when looking ahead to the implications they saw the fearsome abyss of panpsychism, and retreated. My hylonoetic view of mind has some radical and far-reaching consequences, and it is entirely possible that a conventional philosopher would recoil at the thought of them. Taking as I am the 'unconventional' path, I will attempt to follow through on these implications to the fullest limit.

NOTES:

[1] See Kolb and Whishaw (1990: 15).

[2] See Kolb and Whishaw (1990: 22).

[3] The axon releases a small amount of a given neurotransmitter chemical, which acts as a 'key' to unlock a small opening in the dendrite. Upon opening, ions (positively or negatively charged atoms) in the surrounding fluid rush in. If the neurotransmitter is of a certain type, positively-charged sodium atoms rush in, and the effect is excitatory, increasing the likelihood of the recipient neuron firing. Other types of neurotransmitters allow negatively-charged chlorine atoms to enter, and the effect is inhibitory, decreasing the likelihood of firing. After completing its task, the neurotransmitter is either released into the bloodstream or reabsorbed by the axonal bouton. This, in brief, describes how the electrical signal traveling down the axon is

passed over to a recipient neuron, in the form of a small incremental electrical charge, either positive or negative. For a good basic overview see Bloom and Lazerson (1988: 30-40).

[4] A similar figure is given by MacLennan (1996: 414).

[5] A similar estimate for the number of states per synapse was given to me by Leslie Smith (personal communication, 1998). However there is clearly wide disagreement regarding the number of bits that each synapse represents. Walker (1970: 173) gives an estimate of 10^7 bits per synapse, resulting in an astounding figure of 10^{27} bits per brain.

[6] And in some cases into the bloodstream; see Pert, et al (1985).

[7] This same phenomenon, of missing the complexities of chaos by viewing it under digitized conditions, occurs as well in digital computers that model or simulate chaos. There is a strong sense in which *digitization destroys chaos*; I must defer this discussion to a later date.

[8] See for example the book, On the Contrary (Churchland and Churchland, 1998); in several articles on state space, one finds not a single mention of chaos theory.

[9] Freeman used EEG tracings rather than individual neurons or synapses. EEG's track large groups of neurons and so are not as precise, but give the same intuitive picture.

[10] See D. Smith, et al (1999) for a detailed and technical discussion.

[11] My theory of hylonoism sees mind as intimately bound with the structure of matter. The dynamics of matter possess a concurrent dynamics of mind. Both occur simultaneously -- in this sense, it is a kind of parallelism, but not of the mystically-correlated kind that Leibniz envisioned. Following Spinoza, it sees mind and matter as 'of the same order': more complex structures of matter correspond with more complex

spaces of mind. But it is incorrect, on my view, to say *either* that 'mind is causal on matter' or 'matter is causal on mind'. If both are simultaneous aspects of an underlying monism, then the term 'causal' is simply not valid for discussions of the relationship between mind and matter, or in the human case, between mind and body.

Recent philosophical analysis of causation deals primarily with intra-physical causation, via such approaches as a Humean nomological analysis, counterfactual analysis, or probabilistic analysis. Mental-physical causation is rarely discussed, in part due to difficulties in achieving a technical definition of the mental realm. In contemporary terms, my approach may be seen on the one hand as a kind of '*dual concurrent causation'* between mind and matter, each simultaneously causing the other. Others may describe such a view as a variation of causal nihilism, as I claim that traditional notions of causality are inappropriate and inapplicable.

[12] The term 'sphere' is appropriate here, as the imagery is based on the phase space of the brain. The hylon of the brain moves within a 100-trillion-dimensional sphere, due to the fact that the synapse potentials are both of comparable magnitude and finite for all neurons.

[13] My term 'hylon' has no connection with Koestler's word 'holon', as he describes it in his (1967). But there are some important similarities between his general philosophical system and the approach I am advocating. I discuss his ideas further in Part III.

[14] Standard nickel has 31 neutrons, but I use an isotope of 30 here for purposes of comparison.

[15] The hierarchy could as well be extended 'below' – yielding a level of structure at that of the quark-lepton level. This added level of structure does not affect the basic argument.

[16] See pages 278 and 282.

PART II – PANPSYCHISM, HYLONOISM, and the HISTORY of PARTICIPATION

Chapter 5 – Panpsychist Perspectives from the Ancient World

Having established a background of terms and concepts, I now will continue by exploring in detail the participatory nature of mind and matter. I have argued that mind and matter are intimately linked at a fundamental ontological level, so the discussion of one will necessarily involve a discussion of the other. However, I want to examine each of these two aspects of Participatory Reality separately, in order to better illuminate the relevant issues of each perspective.

Part II focuses primarily on the *Partimens*, the realm of Participatory Mind. Here I will trace the history of panpsychism as it relates specifically to the concept of participation. I hope to show that the two lines of thought are deeply connected in a number of important thinkers. Part III will focus on the *Partimater*, or the realm of Participatory Matter.

1) Panpsychism and Participation

Panpsychism is the view that all things have a 'mind', or a mind-like quality. This rough definition will be refined shortly, but it does give the general flavor of this particular concept. The term derives from the Greek *pan* ('all') and *psyche* ('mind' or 'soul'). It is not a single theory, but more of a 'meta-theory': a classification of several philosophical positions, all of which attribute mentality to every object in the universe[1], or to matter in general.

For most of humanity, for most of history, panpsychism has been an accepted and respected view of the world. As I mentioned in Chapter 1, the trajectory of Western civilization has been that of a divergence from a panpsychic, animist vision of the world. This has allowed for tremendous technical and analytic progress, but it has also led to a sense of detachment and isolation; the human mind is seen today as a Great Exception to the natural order of things, either as a completely spiritual entity (for dualists) or as an astonishingly unique act of emergence (for materialists). Panpsychism offers a different resolution to the question of mind, an approach that deeply reintegrates the human being into the order of nature.

The fact that panpsychism has been shared throughout the centuries by thinking people and the common man alike, Eastern and Western cultures alike, indicates that it should not be dismissed out of hand as most contemporary philosophers would have it. Rather, there is a need to understand its origins and how these relate to contemporary ideas and needs. In this chapter and the next I give an overview of how panpsychism has evolved in the past 2500 years of Western civilization, how this is connected with the emerging Participatory Worldview, and indicate how my own theory of hylonoism relates to this stream of thought.

This historical background and comparative study of panpsychism is vitally important to the discussion of the Participatory Worldview, for the following reasons:

1) ***Panpsychism, in itself, is a thoroughly participatory philosophy.*** It is at once an ontology and a theory (rather, meta-theory) of mind. It intimately links 'being' and 'mind'. Panpsychism argues that the human mind is not an anomaly in the universe, but that the human and the non-human share a certain fundamental quality. Further, it is by virtue of this shared quality we come to know the universe, and find ourselves at home in it.

2) ***Panpsychist philosophy, as it has been developed historically, has a number of important links to the philosophical concept of participation.*** One finds numerous instances in which participatory ideas and panpsychist ideas occur in the same individual; this alone suggests a deeper connection. The core concept of participatory philosophy – that the mind is an active participant in the nature of reality – seems naturally to lead to a view in which all things possess some power of 'mind'. One sees this in a wide variety of panpsychist philosophies: from the ancient Greek doctrine that 'everything is full of souls', through the Medieval theories of Telesio and Campanella ("knowledge is participation"),

Spinoza's panpsychic pantheism, Leibniz's spiritual monads, Fechner and the German idealists, Whitehead and Russell's process philosophy, Teilhard's spiritualism, up to modern times.

3) ***Panpsychism finds support from within the Mechanistic Worldview.*** From the mid-1800's on, advances in science and physics have led to a picture of mind that is at least compatible, and often supportive, of a panpsychist view. Evolution was the first major development of the modern era, but theories from quantum mechanics through chaos theory also argue for this interpretation. I will address this issue further in Part III.

4) ***Panpsychism brings into sharp relief the contrast between the Mechanistic and Participatory Worldviews.*** The history of panpsychism has often served as a central contrast to the mechanistic or materialistic theory of mind and reality. Usually in opposition, occasionally in agreement, panpsychism acts as a marker signaling important developments in both worldviews. Panpsychism is a classic example of a *paradigmatic shift in thinking*, as it calls for a fundamental reinterpretation of natural phenomena. It sees different 'facts' in a new light, and reinterprets natural phenomena in a way not possible for materialism. It vividly demonstrates a new way of seeing the world.

5) ***Panpsychism bears directly on my theory of hylonoism, and a historical examination of panpsychist ideas will serve to further articulate it.*** Hylonoism is strongly panpsychist, and a deeper understanding of it can be gained by comparison to similar theories of the past. A look at the connection between past and present finds many areas of agreement, and this suggests that there is a deep sense of truth about hylonoism and the panpsychist view.

6) ***Panpsychism is philosophically valuable, because it offers solutions to mind-body problems that dualism and materialism find intractable.*** Present philosophy of mind is dominated by materialist theories, but they cannot adequately address issues of consciousness, qualia, or the role of mind in the

universe. Materialist theories cannot account for the 'emergence' of mind. Dualism is the traditional alternative, but it too suffers from long-standing weaknesses and unanswered questions. Panpsychism offers a third way.

7) ***Panpsychism is perhaps the most under-analyzed and under-appreciated philosophical position in the history of Western philosophy, and is long overdue for a detailed treatment.*** It is rather astonishing that a philosophical position held by so many major philosophers throughout history has had virtually no in-depth study: no detailed analyses, no thorough survey of positions, little serious discussion of it merits. What follows here, as brief as it is, captures many of the central elements of panpsychist philosophy in Western culture.

8) ***Panpsychism offers, after all, a sympathetic and compassionate picture of the world.*** It stands in sharp relief to the sterile, detached, inert worldview of mechanism and materialism. As such, panpsychism holds promise to alleviate the damage we have seen in recent years, and to open up new lines of thought and research methodology. Ultimately it can offer support to new values for society, ones that may lead to a more sympathetic and compassionate world.

Before moving ahead with my historical overview, I want to take a moment to clarify what is meant by panpsychism, and how I see this term fit within the larger context.

2) Panpsychism Defined

Philosophical arguments often turn on interpretations of definitions, and this is particularly problematic with issues of mind and consciousness. In addition to the obvious problem of lack of agreement on the base definition of 'panpsychism', we have the added complication that the terms used in the definitions are also ambiguous – 'sentience', 'consciousness', 'soul', etc. This is perhaps unavoidable, but it is critical that any attempt at definition of a philosophical term like panpsychism include an adequate explanation of the terms used in the definition. To add to the confusion, the definitions of these terms offered by various writers often use other, equally ill-defined terms, so that a person reviewing the literature may find himself faced with a mass of self-circular definitions, which ultimately rely on some ground-level understanding of our common-sense notions of these terms.

I have attempted a fairly detailed description of my new concept of 'hylonoism'. Hylonoism, as I have outlined it in the preceding chapter, is a universal theory of matter – namely, that all organized matter has a singular identity for itself, that it interacts and experiences the world in a manner that is consistent with how we, as conscious beings, experience the world. Hylonoism reinterprets the human mind in a very specific and universal way, and in the process it sees mind as part of a logical and natural continuum with all levels of physical structure and organization.

To minimize the terminological concerns I offer in this section some explanation of the various terms associated with panpsychism. But the first matter is to define the term 'panpsychism' itself. The philosophical literature cites a number of definitions. The 'official definition', if one can speak of such a thing, would presumably be the one from the recently published (1998) Encyclopedia of Philosophy:

> Physical nature is composed of individuals, each of which is to some degree sentient. ...[They may be said to have] sentience, experience, or, in a broad sense, consciousness. (Sprigge, 1998: 195).

However, one rarely finds the same definition twice. Other recent examples include: "everything has a soul, or...a rudiment of a soul" (Popper & Eccles, 1977: 15); and "all objects in the universe...have an 'inner' or 'psychological' being." (Edwards, 1972b: 22). Even very recently we find inconsistent and sloppy definitions; Chalmers (1996) defines it once as "everything is conscious" (p. 216), and elsewhere as "everything has a mind" (p. 298), apparently regarding the two as equivalent. In spite of these confusions, we may perhaps agree that the *general* meaning is clear: all things have a mind, or mind-like qualities. Unfortunately, the fact that we may have a general understanding of the meaning is not always of much help.

In an effort to clear the air, let me offer my 'definition'. Panpsychism, as I see it, has three essential characteristics. One, that objects have experiences *for themselves*, that is, the mind-like quality is something internal to, or inherent in, the object. Two, there is a sense in which this experience is *singular*; to the extent that a structure of matter and energy that we call an 'object' is *one thing*, this oneness is reflected in a kind of unitary mental experience. Three, an 'object' is a particular configuration of mass/energy, and therefore any configuration of mass/energy, any 'system', qualifies in the same sense. So I see panpsychism as follows: *all objects, or systems of objects, possess a singular inner experience of the world around them.*

To clarify this further, let me offer a few words on what panpsychism does *not* mean. In my view, it does *not* mean 'consciousness'. This term is highly anthropocentric, and its meaning too closely associated with human mental states to serve as a general attribute of reality. Consciousness means, to most people, the aware and alert mental states that we all experience in our waking hours. This meaning is too entrenched, and it would be pointless to fight it. I accept 'consciousness' as a real and meaningful concept, and as a substantial philosophical problem. But I also accept that animals may be said to be conscious; and I allow that it is probably inappropriate to use the term in reference to plants or inanimate objects. Consequently, it is not suitable for use as a general feature of material reality.

Panpsychists are highly sensitive to the use of 'consciousness'. And for good reason. Upon laying out a panpsychist position, one is immediately faced with the charge that he believes that "rocks are conscious" – a statement taken as so obviously ludicrous that panpsychism can be dismissed out of hand. Let me hasten to add that I, too, would take issue with such a claim, because for me consciousness is by definition an animal quality. Even when we might apply it – as some philosophers in fact do – to plants or inanimate objects, we do so primarily as extrapolations from our own internal feelings. We may see strong analogies with the human mind in certain animals, and so we apply the concept to them with varying degrees of confidence. We may see no such analogies to plants or inanimate objects, so to attribute to them 'consciousness' seems ridiculous. This is our human bias. To overcome this anthropocentric perspective, we need to see the 'mentality' of other objects not in terms of *human* consciousness, but as a subset of a certain *universal quality* of physical things, in which both inanimate mentality and human mentality are taken as particular manifestations.

This is partly my motivation for coining the term 'hylonoism' -- to escape the inevitable human bias. 'Consciousness' is perhaps the most notoriously biased term, but other terms suffer this to varying extents. As we saw in the definitions of 'panpsychism' above, there are several terms used in reference to mind, all with slightly different shades of meaning. In addition to 'consciousness', 'mind', and 'soul', a brief survey of the terminology will unearth such terms as: 'self-consciousness', 'mentality' or 'mental states', 'thoughts' or 'thinking', 'feelings', 'experience', 'inner life', 'what-it-is-like-to-be-something', 'qualitative feel' or 'qualia', 'will', 'phenomenal feel', 'awareness', 'psyche', 'cognition', 'perception', 'sense' or 'sentience' – quite an astonishing array of meanings and intonations, and many a philosophical argument has been fought over the minute subtleties of the these words. All these terms evolved in a human context, and consequently all have varying levels of humanistic bias.

For me, panpsychism does *not* mean 'soul', in the traditional theological sense. This point is particularly important to clarify, because of the standard translation of *psyche* into 'soul' – which today would imply a deeply theological worldview. Some might see 'pan-soul-ism' as an attempt to retain some remnant of religion, a kind of antidote to the soulless world of secular materialism. This is certainly not the meaning of contemporary writers. For this reason, 'panpsychism' might better have been replaced by some term such as 'pan-nous-ism' (as I in fact have done with my term hylonoism). Be that as it may, the philosophical literature of the 20th century – certainly since Hartshorne's writings in the mid-1930's – have adopted the word panpsychism, so I continue with it. Personally though, I reject any definition that uses the term 'soul' because of both the theological insinuations and the anthropocentrism inherent in the word.

Panpsychism does *not* mean 'cognition' or 'thinking'. As I take it, thinking involves purposeful planning, considering of alternatives, holding of beliefs; this I see as attributable only to animals, in various degrees. Cognition refers primarily to an especially deep and insightful thinking, a reasoning power through the use of inference or deduction -- primarily the rational thought process of humans. There is perhaps a very loose sense in which to think could mean 'to process information', wherein we might attribute this quality to all objects, but I believe this adds little value to the discussion.

And, panpsychism does not mean 'emotion'. Emotions as commonly understood are the responses of living organisms – to which I would include both animals and plants. The actual feeling of a particular emotion, like fear or affection, naturally depends on the nature of the organism. It would be inappropriate to suggest that all living things felt 'love' or 'pain' in any sense in which humans feel it. But I take it as probable that all life experiences something that is sufficiently close to our own emotions to classify them under the same general heading. Let me note in passing that it is an interesting conjecture whether *systems* of living organisms, like an ecosystem or the Earth, may be said to feel 'emotions' (personally I am sympathetic to such a view).

The best attempts to date at overcoming this general human bias are typically those that put a qualifier in front of the reference to mind: '*proto*-mentality', '*low-grade*-awareness', '*occasions* of experience', and so on. But even these ultimately refer back to our own sense of mentality or awareness or experience. It is my hope that hylonoism will succeed in overcoming this bias by (a) giving a concrete picture, though phase space analysis, of what, for example, a hylon is, and (b) demonstrating that it is a truly general quality of dynamic systems, and thus a *larger* concept than any and all human-oriented conceptions of mentality.

In spite of these problems, certain terms can reasonably be applied to all things, if we are careful with our usage. For example, 'experience', if understood as exposure and reaction to external events, clearly applies to objects generally. Other terms, like 'mind' or 'mentality', can be reasonably defined (I claim) to be universal properties. In general, I will try to avoid the most biased terms, and use words of my own construction as necessary.

It may perhaps be useful to construct a sort of hierarchy of terminology, ranging from the most human-like to the most universal (in my context). This is by no means the commonly accepted order, and certainly every philosopher would construct a different arrangement. This is purely my subjective ranking of terms, for the purpose of clarifying my usage of these terms.

Humans: Self-consciousness, 'soul', cognition.

All Animals: Thinking, consciousness.

Animals and Plants: Sense, awareness, sentience, emotion.

All Animate and Inanimate: Experience, mind, mentality, what-it-is-like, qualia.

There is of course considerable overlap at the boundaries of these four categories. The higher primates, for example, probably have most all attributes of humans, including some level of self-consciousness and certain aspects of cognition. As I explore the details of various panpsychist philosophies, I will add some detail to the meanings of these words in the hopes of moving toward a consensus on their application. Again, I offer this only by way of clarifying some common misconceptions. I will generally try to avoid the more contentious terms. The remainder of this thesis does not turn on the above distinctions.

* * * * *

Definitions of panpsychism are one source of confusion; synonyms are another. Let me briefly mention some philosophical terms that are related to panpsychism, and often mistaken for it. First, there is *animism*. Deriving from the Latin *anima* ('soul'), this term is used for the belief that everything in the universe has a spirit or soul. It is usually connected to pre-Christian or tribal religions, and has a strong air of superstition and mystery. Most commonly, it is used in a primitive, pre-scientific sense, in which objects have 'spirits'. These spirits typically have a human-like nature or personality, such as the 'spirit of the tree' inhabiting a tree or the 'water-spirit' inhabiting a lake. The human-like spirits typically would exhibit all the properties of a rational person, perhaps including intelligence, belief, memory, agency, and so on. It is this highly anthropomorphic nature that characterizes animism, and that clearly distinguishes it from hylonoism, which specifically does *not* attribute high-level capabilities to non-human entities. Animism thus is taken as having little philosophical standing.

Second, there is the term *hylozoism*, from Greek *hyle* ('matter') and *zoe* ('life'); it is the doctrine that all matter is intrinsically alive (sometimes used synonymously with the terms *panbiotism* or *panzoism*, and even, incorrectly, *vitalism*). Note first of all the important distinction between *hylozoism* and my term, *hylonoism* -- 'everything is alive' vs. 'everything has a singular noetic quality'. In hylozoism, every rock, every atom, every particle, is claimed to have some degree or sense of life. Introduced as a philosophical term in the 17th century, hylozoism has recently been used most often in reference to the early Greek philosophers, especially Thales, Heraclitus, and Empedocles -- of which I will give details later on. Having, therefore, this pedigree of philosophy, it is more frequently discussed, though typically in a historical (and negative) sense. I too will use hylozoism, but only in the historical sense, as I do not see it as a valid or helpful term in the modern usage.

A third term is *pansensism*, meaning 'everything (*pan*) senses' (synonymous with the infrequently used term *hylopathism*). This word is typically associated with the panpsychist views of Telesio, Campanella, and Mach, but one also finds Peirce referring to his own view as that of 'hylopathism'. A key issue is how one defines 'sense'. 'To sense' generally takes on a bio-centric meaning, i.e. a product of one of the living sense organs of a plant or animal. 'Sense' can take on a wider definition, though, approaching the general definition of 'experience' that I offered above. In this case, it may become quite close to my meaning of hylonoism. However, in general the ability to sense is most appropriately associated with life; hence, to speak of inanimate things as sentient or sensing is to introduce unnecessary complications and perhaps inconsistencies.

Then there is the word *pantheism*, which means literally that 'all' (*pan*) is 'God' (*theos*) -- God is identical with everything that exists, i.e. the universe. What this actually means is not entirely clear, and in fact a precise definition is not easy. At a minimum, it means that the Cosmos has a divine quality, that all material objects, including humans, are part of that divinity, and that the divine is a unity. It also typically implies that God is a non-personal being, that there is no Creator or Providence, and that there is no transcendent realm of the Divine. Spinoza is the philosopher perhaps most typically associated with pantheism, as he equated God with Nature. But he was also a panpsychist, as he claimed that "all things are animate in various degrees" (Spinoza, op cit.). For my purposes, I will not be addressing issues of religion here, although I would like to note that, if 'divine' is taken to mean 'sacred, or deserving of highest respect', then I do in fact hold to the basic position cited above, as I think many people today do. A hylonoist account of the universe does, in fact, support such a reverential position, and I would find it a natural extension of both my theory and the Participatory Worldview.

A fifth term is *panentheism*, which is closely related to pantheism, and often confused with it. The etymological meaning is *'pan-en-theos'*, 'all in God', or more simply, God is in all things. To distinguish from pantheism, the common analogy is a sponge: just as water can completely saturate a sponge without being the sponge, so too God is said to saturate all things while at the same time being a transcendent and unchanging Deity. Panentheism can be confused with panpsychism, since (on the traditional view) God is omnipresent, and if God represents 'spirit' or 'mind', then all things could be said to contain mind – the mind of God. The central issue here is whether we speak of such mind as 'mind of single universal being' (God, the Absolute, the World Soul, and so on), or of mind as attributable to each thing in itself, of each object possessing its own unique, individual mind. The former view would be a *monist* concept of mind, the latter a *pluralist* concept. The monist view is relatively close to a traditional theist viewpoint, thought perhaps not acknowledged as such, and thus has less bearing on the philosophical issues discussed here. The pluralist view is comparable to panpsychism as I see it; the only remaining issue is whether or not one views such universal, pluralist mind as a deity; if so, then panpsychism can be seen as a variation of panentheism.

And last, the word *panexperientialism*, the doctrine that 'everything experiences'. This term was coined by process philosopher David Ray Griffin in 1977 (see Griffin, 1977: 98, or 1998) to define a particular version of panpsychism deriving from Whitehead and Hartshorne, with strong foundations in the thinking of James. Whitehead took 'events', or, in his terminology, "occasions", to be the fundamental metaphysical reality, and this was linked to the concept of experience – undoubtedly influenced by James' theory of 'pure experience' as the basis of all reality. Panexperientialism is the most fully articulated form of panpsychism. Hartshorne, Griffin and other process philosophers deserve credit for keeping alive the debate over panpsychism in general, and they have marshaled a large amount of evidence both for their position and as criticism of the dominant materialist and dualist ontologies; for the most recent account, see Griffin (1998). Panexperientialism is quite close in spirit to hylonoism except for one major point, which I will discuss in detail later. In a nutshell, panexperientialism has a fundamental inconsistency; it attributes experience not literally to all things, but only to "genuine units" or "true individuals". For reasons I will explain later, this to me is a false distinction; any aggregate qualifies as an individual, in the hylonoetic sense. This is the only way to maintain consistency.

I trust this provides a necessary clarification and distinction, because, as I have said, often times debate over a philosophical position either degenerates into a semantic argument or ends up inconclusive because the two parties were not able to meet on common ground. There are much deeper issues to tackle than semantics when it comes to philosophy of mind.

Finally, let me explain briefly my earlier statement that panpsychism is a 'meta-theory'. Panpsychism occupies an interesting position in the overall logical geography of mind, because it parallels the 'standard' (i.e. anthropocentric) theories. Each standard theory offers a different strategy for explaining how the human mind interrelates to the brain and body, and panpsychism can, in principle, adopt virtually any one of them as well. It simply would *generalize the strategy and apply it to all matter*. The only strategies not relevant to panpsychism would be those of the eliminativist type, which deny mentality altogether, or those which expressly require a biological or human embodiment, such as Searle proposes. This point will become clearer as my investigation progresses.

With this background in place, I will now begin to survey the evolution of panpsychist thought from the time of the pre-Socratics through the present. The history of panpsychism is a central element of the history of the Participatory Worldview, and it also serves to illuminate the details of hylonoism. Along the way, I explore some related themes, including the emergence of the Mechanistic Worldview. I also continue to develop the importance of the concept of energy and its role in the evolution of structure.

3) 'Hylozoism' and the Ancient Greeks

Pre-Christian era Greece may be divided into three periods: (1) pre-Socratics, (2) Plato and Aristotle, (3) the Stoics. A timeline showing the lives of the prominent individuals is given in Appendix A. Each of these groups of thinkers has unique perspectives on panpsychism in particular, and on the concept of participation in general. Let me mention here that I have largely excluded Socrates (470-399 BCE) from this discussion, because first, he appears to not have addressed in detail the metaphysical issues I am discussing here, and second, it is difficult to distinguish his ideas from those of Plato; I will thus treat Plato as the chief representative of the 'Socratic/Platonic' metaphysical system.

Pre-Socratic philosophy covers a range of roughly 200 years, from the birth of Thales in 625 BCE to the death of Socrates in 399 BCE. It was in this time that philosophy in the modern sense was born. There were some dozen or so major philosophers[2] who emerged from the Greek world in these two centuries, and they are traditionally grouped into various subdivisions. The first three men of whom we know any details – Thales, Anaximander, and Anaximenes – are known collectively as the Milesian philosophers. Following them came the lone and mysterious figure of Pythagoras (570-495 BCE), a man who single-handedly created his own school of thought. Then there are the representatives of the Eleatic tradition, in the persons of Parmenides, and Zeno of Elea (505-450 BCE). Cotemporaneous with the Eleatics, and representing the 'school of change' was Heraclitus. Next came the "pluralists", Anaxagoras and Empedocles, followed by the "atomists", Leucippus and Democritus[3]. With perhaps the exception of two of these men (Anaximander and Zeno), all advanced ideas relevant to our discussion of participation and panpsychism; *all were, to some degree, panpsychist.*

Let me note at the outset that the term 'hylozoism' that is so often applied to the Greeks is misleading. This word indicates that the quality shared by all things is 'life', but in fact one finds no such reference to *zoe* (life) in their writings[4]. Rather, it is a more spiritual or mind-like quality that is attributed to all things, as I shall demonstrate.

As the 'first Western philosopher', it is significant that **Thales** is known for his panpsychist views; this fact gives a strong indication of the sense in which it was integral to the ancient world. There are only a few remaining fragments of his thought, but his intentions come through quite clearly. Two of these fragments are of interest, and both are recounted by Aristotle in his De Anima. First, the famous passage on the loadstone (magnet):

> And Thales, according to what is related of him, seems to have regarded the soul as something endowed with the power of motion, if indeed he said that the loadstone has a soul because it moves iron. (405a19).

Thales offers two distinct ideas here. First, that 'soul' is the source and cause of motion. Second, that, therefore, the loadstone itself has a soul because it can attract iron. And it is important to keep in mind here that Aristotle's (and Thales') original term *psyche*, though often translated as 'soul', is virtually synonymous with the modern term 'mind' (though with the connotation of a 'divine life force').

It is clear that people and all animals possess a soul/mind because they have the power of movement. Of course, many things in the world around us move – wind, rain, falling rocks, stars. The next issue, then, is whether *all* things that move have souls. It seems that Thales saw nothing fundamentally unique about the loadstone; rather it was simply a more pronounced effect of something that was universal in nature. We know this by the second important fragment:

> Certain thinkers say that soul is intermingled in the whole universe, and it is perhaps for that reason that Thales came to the opinion that all things are full of gods. (De Anima, 411a7).

The word 'gods' (*theon*) is interesting, as it shows the divine nature of the *psyche*, the soul/mind. *Psyche* is seen by Thales as interpenetrating all things, and dwelling in them individually and plurally, rather than as a single divine entity. This is the essence of panpsychism.

Anaximenes put forth the *pneuma* (air) as the underlying *arche* of the cosmos. *Pneuma* has a number of related meanings, many of which correspond closely with that of *psyche*; in addition to 'air', it can mean 'breath', 'soul', 'spirit', or 'mind'. The *pneuma* penetrates and underlies all things, and so a logical extension of Anaximenes' system would entail that all things also are endowed with a spirit or soul. He makes explicit connection between *pneuma* and *psyche* in the following fragment: "As our soul...being air, holds us together and controls us, so does [breath] and air enclose the whole world." (Aetius I, 3, 4, in Kirk (et al), 1983: 158-9).

Chronologically, the next major figure after the Milesians was the enigmatic **Pythagoras**. Like Socrates, he apparently wrote nothing. His closest followers formed a cryptic, secretive cult, so we have little direct reporting on him; most of what is known is anecdotal. He is rumored to have said "Everything is intelligent!", but this is difficult to confirm with much certainty. It seems clear that he held to a mystic, pan-spiritual view of the universe, so it is quite likely that he too developed some variation of hylozoist or panpsychist philosophy.

Parmenides' panpsychism is less clear than the other pre-Socratics. We know that he equated 'being' with 'thought', and thus saw mind as inherent in all things – though possibly in an idealist sense rather than an ontological sense. The most interesting statement by Parmenides occurs in fragment 3; he writes: "for it is the same thing to think and to be" (Freeman, 1948: 42). This has a double implication – (1) all thoughts constitute 'being', and (2) all things that can be said 'to be', also think. It is unclear precisely the intent of this fragment, though, and the few other fragments do not add much illumination along this line. Whether existent things, individually, are to be identified with individual thoughts – or self-possessing thoughts – is undecided.

In opposition to Parmenides' static world of pure Being, **Heraclitus** conceived a worldview in which change and motion were the essential reality. In a fitting manner, 'fire' became his *arche*. To the ancient Greeks, fire was seen as a form of pure energy, and it is interesting that Heraclitus should develop an 'energeticist' worldview some 2300 years before it became the fashion in modern physics. Fire, like the *pneuma* of Anaximenes, was associated with life-energy; significantly, Heraclitus referred to this fire not merely as *'pyr'*, but as *'pyr aeizoon'* – an "ever-living fire". Consequently, this life-energy was seen as residing in all things. Smith translates one key fragment as follows: "All things are full of souls and divine spirits." (1935: 13). Freeman translates fragment 113 as: "The thinking faculty is common to all." (1948: 32). Heraclitus' view on this matter seems quite clear.

Anaxagoras envisioned the world as composed of a myriad of substances, but these were ordered and regulated by a single over-arching principle, *nous* (mind). This is a significant development, because it demonstrates increasing articulation of the difference between the terms mind, soul, and spirit. More so than *psyche* and *pneuma*, *nous* is a unifying mental force that is interwoven with the movement and actions of disparate elements.

There are a number of important themes in the writings of Anaxagoras that anticipate hylonoism and the concept of participation. First recall two quotations that I cited back in Chapter 1: "And whatever things were to be, and whatever things were, as many as are now, and whatever things shall be, all these mind arranged in order" (fragment 12, in Smith, 1934: 34). Mind is clearly ubiquitous, omnipresent, and even god-like. The action of mind is analogous to that of rotation: "[M]ind ruled the rotation of the whole, so that it set it in rotation in the beginning." (ibid). And furthermore, "Rotation itself caused the separation..." (ibid). So mind acts by a rotation of the infinite elements, which causes the diversity of things to come into being. Thus it is clear that mind causes motion, as it had for the earlier thinkers. But this motion is of a specific kind, namely *circular*. The idea of circular motion recalls the concept of *feedback*, in which mass/energy follows looping patterns that fold back on themselves. I have emphasized that such 'circular motion' is an essential part of chaos, as well as of producing quasi-stable structures. And the movement of the hylon is circular in nature, as it traces out its quasi-attractor orbits in the hylosphere. Anaxagoras seems to recognize the importance of these concepts, but he attributes a distinct causality to mind that I deny; he says that mind yields (causes) the rotation of matter, whereas I argue for a dual concurrent form of causation (cf. my note 11, Chapter 4).

I have also stressed that the nature of mind is universal, that all movements and systems of matter give rise to mind of the same qualitative nature (i.e. of a hylon moving in phase space), but with varying degrees of intensity. Anaxagoras makes the same conclusion: "All mind is of like character, both the greater and the smaller." (ibid). Furthermore, I have made the point that the hylon is something distinct from material reality, and does not exist in any material sense; Anaxagoras, too, sees mind as uniquely distinct from matter: "Nothing is absolutely separated nor distinct, one thing from another, except mind." (ibid).

This last citation refers to another basic principle of Anaxagoras, namely, that each element is present to some degree in every other element: "nothing is absolutely separated nor distinct". There are no 'pure' elements. In another fragment he makes this explicit: "a portion of everything exists in everything" (ibid). This idea anticipates developments in particle physics and quantum mechanics, which I will examine deeper later. Here, let me note that I see this as the *first explicit reference to the concept of participation* that I defined earlier. Recall that tripartite definition: 'to give, to receive, to possess something of the other'. If everything 'contains' some portion of every other thing, then all things interpenetrate one another, and all co-participate with each other, *as an essential aspect of their being*. Anaxagoras has spelled out an elemental kind of participation, something which occurs continuously and automatically. This in fact is compatible with current views of matter, as I shall show.

Finally, one last citation indicates more explicitly the panpsychist inclinations of Anaxagoras. In Aristotle's Metaphysics, one finds the following statement attributed to him: "[J]ust as in animals so in nature mind is present and responsible for the world..." (984b15). The mind that is ubiquitous is not just some amorphous, abstract mind, but essentially like that of animals, i.e. an animated soul or spirit. Mind is present both in the c osmos *and* in the specific objects, such as animals. This implies a multi-level system of mind, occurring distinctly in different levels of structured matter. This again suggests a panpsychist interpretation, and is consistent with the position of hylonoism.

A contemporary of Anaxagoras, **Empedocles** was content with a four-element physical world. He took the *water* of Thales, the *air* of Anaximenes, the *fire* of Heraclitus, and added a fourth and final element – *earth*. These elements were presided over by the two forces, Love (attraction) and Strife (repulsion). Thus, Empedocles and Anaxagoras were the first thinkers to posit a system composed of two basic classes of entities: *elements* (i.e. mass), and *force* (i.e. energy); a fascinating anticipation of the modern view of physics.

More than any other pre-Socratic, panpsychism is central to Empedocles' worldview. Guthrie states that "it was in fact fundamental to Empedocles' whole system that there is no distinction between animate and inanimate, and everything has some degree of awareness and power of discrimination." (1962-81, vol. 2. p. 233). Evidence of this exists in a number of different fragments. Smith cites the following quotation in which Empedocles simply states: "[A]ll things have the power of thought." (fragment 103; 1934: 31). Further evidence comes from Aristotle: "Empedocles [says that the soul] is composed of all the elements and that each of them actually is a soul." (De Anima, 404b11).

Equally important for my purposes is his introduction of the concept that may be called *participatory epistemology*. Empedocles was the first Greek philosopher to emphasize, if not originate, the idea that 'like knows like'. Knowledge of a thing occurs because both the knower and the known share something in common; they co-participate by means of a common element of the world. This is revealed in the famous passage that I cited in Chapter 1, and which immediately follows the sentence cited above in De Anima: "For by earth we see earth, by water water, by ether [i.e. air] bright ether, and by fire flaming fire, love by love and strife by mournful strife." (404b12). We humans come to know the Earth precisely because the element earth is part of us. We both partake of the same element, thus we can literally feel the presence, the "soul" of that aspect of reality, and thereby we know it. The same with any two composite objects; the common elements within them co-resonate, and by this they each achieve an understanding of the other[5].

There is a related aspect of participatory thinking in Empedocles' thought, and this is his concept of *'effluences'*. He believed that all things had tiny openings or pores within them, out of which emanated a continuous 'flux' or a 'flow' of some kind. This effluence must first of all be material (earth, water, air or fire), since these are the only allowable elements of reality (presuming that it is neither Love nor Strife which emanates). Also, this effluence represents a kind of evaporation or dissolving of the object, and over time ultimately leads to its end. The key passage comes from Plutarch:

> Look at it in the light of Empedocles, 'Perceiving that there are effluences from all things that have come into being.' Not only from animals and plants, or earth and sea, also from stones, bronze and iron there is a continual and abundant outflow. Indeed it is this unbroken flux and movement which causes the destruction and perishing of everything. (Guthrie, 1962-81, vol. 2: 151)

Thus, not only "thought" but movement and outflow are inherent in all things.
One can imagine that this idea of outflow might have come from an examination of the sense of smell. The fact that things such as a flower have a scent can easily lead to a participatory theory of exchange: flowers are continually giving off some material, something of themselves, which is incorporated by the sensing individual. Flowers give off a scent for much of their existence, and then they die. In fact, the scent is actually the flower's *raison d'etre* – to attract a pollinator. Likewise, a puddle of water evaporates and 'dies'. Living things discharge their strength over the course of their life,

they give off their energy to the surrounding environment, and then they expire. Empedocles must have been aware that all things become aged and weathered with time, become broken down, disintegrated. He thus made this process of effluence a universal and fundamental property of things. There are yet further implications of this concept in the ideas of 'dissipative structures' and 'superabundance' that I will discuss later on.

As a final observation on the pre-Socratics, let me note some comments by the atomist philosophers, **Leucippus** and **Democritus**. They are often depicted as proclaiming a harshly materialist worldview, of nothing but 'atoms moving in the void'. This is not entirely correct. Certain atoms possess the property of *soul*, and these are of a spherical shape, in order to better interpenetrate all things. Aristotle informs us, "[T]hose [atoms] which are spherical [Democritus] calls fire and soul" (De Anima, 404a2) – echoing Heraclitus. The roundness of the soul atoms accounts for their special properties:

> Spherical atoms are identified with soul because atoms of that shape are most adapted to *permeate everywhere*, and to set *all the other [atoms] moving* by being themselves in movement. (404a5, my italics)

Since soul atoms are everywhere, one can reasonably conclude that all things are ensouled.

But there are several open questions. We do not know if the soul atoms are *always* everywhere, or of they come and go at times. We do not know if they are the *only* source of motion, or if other things can cause motion as well. And we do not know how they combine to produce the *unified sense of being* that human beings feel, and perhaps all things feel as well. The panpsychism of the atomists is at issue, but their few relevant comments are highly suggestive.

4) Panpsychism in Plato and Aristotle

The common view of Socrates, Plato, and Aristotle is that they made a break from the mystical 'hylozoism' of their predecessors, and set philosophy forth on a new path of rationalism and logic. Certainly they did break new ground, but there was less divergence from panpsychism than is acknowledged or understood. Plato makes a number of intriguing comments in support of panpsychism, and even Aristotle makes some surprising statements. Plato's references are the most interesting, but I cannot fully spell out the arguments for his panpsychism here. Rather, let me note the most relevant passages.

Significantly, the passages suggestive of panpsychism occur primarily in three of Plato's last works – Philebus, Timaeus, and Laws. This implies that they represent Plato's mature thinking on the matter, and thus have some strong degree of significance in his overall system.

First, though, I want to note one passage of interest in an earlier dialogue, the *Phaedrus*. Socrates is lecturing to the young Phaedrus on the nature of philosophy and rhetoric. The discussion takes place, atypically, outside of town in the shade of a large plane tree. The setting inspires Socrates to reflect on nature. Near the end of the dialogue he makes the rather surprising claim that nature was the original source of philosophy, and that the rocks and trees speak "the truth". As he says:

> [T]he priests of the temple of Zeus at Dodona say that the first prophecies were the words of an oak. Everyone who lived at that time, not being as wise as you young ones are today, found it rewarding enough in their simplicity to listen to an oak or even a stone, so long as it was telling the truth... (275b)

One is not sure how to take this passage. Is it meant to be a true account, or simply an allegorical reference to the knowledge that can be found in contemplation of nature? There seems to be three points here: one, it acknowledges the mythological animism of Socrates' ancestors; two, it suggests that Socrates is not entirely enamored of this mode of learning (too much 'simplicity'), which is natural given his emphasis on dialectics; but three, there is an indication that perhaps there is some truth in the idea that rocks and trees can 'speak the truth'. One senses a certain sympathy with the ancient ways of knowing nature.

As to the main dialogues: In the Philebus one finds, first of all, Plato's articulation of the concept of the *anima mundi* – the world-soul. He argues that the universe, like the human body, is composed of the four Empedoclean elements (fire, air, water, earth). Both the human and cosmos are well-ordered and exhibit clear signs of *logos*, of rationality. The body, though nothing more than a well-ordered combination of the elements, possesses a soul; therefore a reasonable implication is that the universe too is ensouled. As Plato says, "[T]he body of the universe which has the same properties as our [body], but more beautiful in all respects...possesses a soul." (30a). This conception of the world-soul is important, but it *does not, in itself, qualify as panpsychism*. The world-soul is perhaps best seen as a form of theism, or even pantheism. Panpsychism requires that each thing individually possesses a soul/mind. Of course, most any form of panpsychism will entail something like a world-soul, but the reverse is far from true. *Panpsychism implies a world-soul, but not necessarily vice versa.*

However, Plato's argument for the world-soul also happens to contain a subtle argument for panpsychism. He implies that the property of 'ensoulment' is associated with well-ordered objects that are composed of the four elements. Since this applies in varying degrees to all things, one can reasonably infer that the quality of 'soul' corresponds with all material objects, or systems of objects. If this were *not* the case, then there must be something fundamentally unique about mankind and the cosmos that they alone are ensouled. Plato gives no indication that this is true. Thus one is left with the panpsychist implication.

In the Timaeus, one finds Plato's account of how the creator of the universe – the 'demiurge' – brought the cosmos into existence, and endowed it with a world-soul: "the divine providence brought our world into being as a truly living thing, endowed with soul and intelligence." (30c). Later in his account of creation, one learns that not only is the cosmos as a whole ensouled, but so too are the *stars,* individually; Plato refers to them as "divine living things" (40b). Not only living, but ensouled: "[the demiurge] assigned each soul to a star" (41e). Then as well the *Earth,* described as a "god" (40c), "foremost" in the cosmos. Still, our picture is incomplete. Plato informs us that humans, the cosmos, the stars, and the Earth are ensouled individuals. Is this all? Either there must be something unique about this set of objects, or else ensoulment must be a general characteristic of the universe.

Laws strengthens the case for panpsychism. Here Plato defines 'soul' as the *ability of self-motion.* Furthermore, self-moving objects may be said to be 'alive'. Thus he makes a three-way identification: soul equated to self-movement, equated to life; anything possessing any of these qualities possess all of them. And, as I have argued, such objects may also be said to possess a mind.

Soul is "the source of motion", and the "master" over all matter (896b-c). It is the cause of all things, and "controls the heavens as well" (896d-e). The question arises in the dialogue whether soul drives the cosmos as a whole, or drives each heavenly body individually – the answer being the latter. As an example, Plato refers yet again to the stars, specifically to the *sun*: "Everyone can see its body, but no one can see its soul... [The soul of the sun] is totally below the level of our bodily senses, and is perceptible by reason alone." (898d). This is a fascinating statement, as it tells us that the *psyche* of celestial bodies can only be known rationally, not empirically. In a like manner, hylonoism argues that the mind in all things is not empirically knowable, but rather can be understood both rationally (through an understanding of dynamical systems) and in a directly intuited but non-empirical manner.

Yet the final question remains: Is something unique about the cosmos, the stars, the Earth, and humans, or do all things possess souls? I believe that the following passage is decisive:

> Now consider all the stars and the moon and the years and the months and all the seasons: what can we do except repeat the same story? A soul or souls...have been shown to be the cause of all these phenomena, and whether it is by their living presence in matter...or by some other means, we shall insist that these souls are gods. Can anybody admit all this and still put up with people who deny that 'everything is full of gods'? (899b)

In a nod to the famous line by Thales, Plato seems to resolve this issue for us. If this single statement seems less than definitive, note that there is *no argument at all* to explain why humans, stars, etc alone are ensouled. So there exists one strong statement in favor of panpsychism, none to counter it. Considered as a whole, the case leads toward the panpsychic conclusion.

Panpsychist inclinations in Plato seem not directly connected to his ideas on participation (reference Chapter 1), but the simple fact that one finds convergence between the two concepts – participation and panpsychism – in a single person is significant, and something that occurs numerous times throughout history. This repeated convergence of ideas is too striking to be coincidental.

In the case of Aristotle, there is nothing quite as compelling as the numerous statements by Plato. Yet even here one finds suggestive claims in support of panpsychism. Aristotle's belief that plants possess a type of soul is well known (cf. De Anima, 411b27). Consequently, the common view is that he attributes soul only to living things. This is true, but he has a generous definition of 'life'.

Consider two statements of his in De Caelo ("On the Heavens"). In Book II (continuation of "On the heavenly bodies"), Aristotle is discussing the causes of motion of the heavenly bodies. Without any warning, he suddenly states, "[W]e have already decided...that the heaven is alive and contains a principle of motion." (285a28-30). It is not clear where or how we have decided this. But his belief that "heaven is alive" would seem to be an endorsement of Plato's world-soul.

One might be inclined to view this admission as extraneous, as perhaps inserted by some unknown transcriber long ago. However, there is another, more suggestive passage in Book II. Aristotle is still addressing the motions of the heavens, and in particular that of the stars. The key passage is as follows:

> [I]f we base our inquiry on what we know, the present difficulty [of understanding the motions of stars] will not appear as anything inexplicable. The fact is that we are inclined to think of the stars as mere bodies or units, occurring in a certain order but completely lifeless; *whereas we ought to think of them as partaking of life and action.* (292a18-21, my italics)

This is a rather astonishing statement by Aristotle. Not only are the heavens alive, but so too are the stars individually. And again, we see the correlation between panpsychist concepts and participation; he uses the verb 'partake' – to participate – when describing the relationship between stars and life. It appears that he has accepted yet another element of Plato's philosophy.

Unfortunately, Aristotle fails to elaborate on these ideas. Other references to panpsychism are vague. Charles Hartshorne finds some evidence for it:

> Aristotle's statements that the soul...is all things, that all things are moved by God as the lover by what he loves (implying that all things love, and thus are sentient...), that a soul is the form of any organized, self-moving body (implying that if...nature consists entirely of more or less organized, self-moving bodies...then nature consists entirely of besouled constituents)... (1950: 443)

The overall case is certainly less compelling than with Plato, yet the evidence is intriguing. It suggests a lingering, subconscious panpsychism in Aristotle, something that only rarely bubbles to the surface.

5) The Stoics

At about the time of Aristotle's death in 322 BCE, Zeno of Citium arrived in Athens to begin his life of teaching. He lectured along the painted collonade in Athens, a kind of long porch or platform, called a *stoa*. Thus began the third great phase of Greek philosophy, a system of philosophy known as Stoicism. This system was in fact the dominant philosophy in much of the ancient world, for a period of almost 500 years.

Zeno and his major followers (Cleanthes and Chrysippus) formulated a comprehensive philosophical system that built upon the cosmological, logical and ethical developments of their great predecessors. Not surprisingly, they adopted many of their fundamental assumptions about the nature of being and mind. Matter, for example, was seen in the standard Empedoclean manner, as composed of fire, air, water, and earth. Like Empedocles and Anaxagoras, the Stoics posited both material substance and the concept of *organizing force principles* in their cosmology; for them, the principles of 'active' and 'passive' accounted for all order and structure in the world. Like Plato, they accepted the idea of a world-soul. And they followed Aristotelian notions of form.

Of the four elements, fire and air were considered the embodiment of 'active', and water and earth of 'passive'. Fire and air were unified under a single concept, known as the *pneuma*. Drawing on Anaximenes and (more heavily) on Heraclitus, the *pneuma* was put forth as the creative life energy of the universe. This was most evident in human bodies, in which both warmth (fire) and breath (air) were seen as the essential defining characteristics of life and soul. *Pneuma* was the active principle made tangible, and as such it accounted for all form that was seen in worldly objects. *Pneuma* was the 'creative fire' of the cosmos, a *pyr technikon*. It had the status of divinity, and was equated with both god and cosmic reason.

Thus far it appears that *pneuma*, or god, is merely the creator of all things; as 'reason' or 'mind', it leaves its mark in the complex form of material objects. The key question (with respect to panpsychism) is whether *pneuma* is merely some external creative force, or whether it continues to inhere in all things as an in-dwelling mind-like entity.

Fragments from Stoic teachings give us a good indication. Diogenes Laertius wrote that in the Stoic view, "mind penetrates every part of [the cosmos] just as soul does. But it penetrates some things more than others." (Inwood and Gerson, 1997: 133). The implication here is that degree of mind somehow corresponds with degree of structure (just as hylonoism claims, incidentally), something one might not expect from a single, external creative god. Cicero informs us that the Stoics followed Plato in his attribution of life to the stars: "[T]he cosmos is divine, [and] we should assign the same sort of divinity to the stars... [T]hey too are also said quite correctly to be animals and to perceive and to have intelligence." (ibid, sec. 41). More generally, Cicero states that "the parts of the cosmos...contain the power of sense-perception and reason." (ibid, sec. 30). A panpsychist outlook is the most consistent explanation for these views.

Modern commentators also reach panpsychist conclusions. Sandbach sees in the Stoic philosopher Posidonius the idea that "a 'life-force' could be recognized everywhere." (1975: 130). The element of fire is the source of this life energy, because "fire has in it a 'vital force'." (ibid, p. 134). A. A. Long notes that in the Stoic system "mind and matter are two constituents or attributes of one thing, body, and this analysis applies to human beings as it does to everything else." (1974: 171). All material objects are 'bodies', and they are in fact "compounds of 'matter' and 'mind' (God or logos). Mind is not something other than body but a necessary constituent of it, the 'reason' in matter." (ibid, p. 174).

In addition to its cosmic role, *pneuma* also has an important physical meaning that relates closely to hylonoism. The *pneuma* serves four roles: (1) it provides a cohesive force that holds all things together, both individually and as a whole; (2) it makes things a unity, gives them a singular identity; (3) it is dynamic, and intimately involved with the concept of motion; and, (4) it serves as a means of communication or exchange within an object.

Regarding the first role, *pneuma* acts as the cohesive force of the universe. Recall the same view of Anaximenes: "our souls...being air, hold us together". Cicero tells us, "There is, therefore, a nature [*physis*, i.e. *pneuma*] which holds the entire cosmos together and preserves it..." (in Inwood and Gerson, 1997: 146). *Pneuma* acts not only on the cosmos, but on individual objects as well. Referring to its cohesive force, Long writes, "This function of *pneuma* in the macrocosm is equally at work in every individual body" (1974: 156). The cohesive force exists in three distinct degrees of intensity, or tension (*tonos*). At the lowest level -- that which holds all objects together, including 'inanimate' ones like a stone or a table -- it is called *hexis* ('condition', or 'state', or 'tenor'). Higher up, at the level of living organisms (animals, plants and vegetative life), it is called *physis* ('nature'). At the highest level, of animals and humans, it is called *psyche* – 'soul'. It is all the same *pneuma*, just existing in varying degrees of *tonos*. This quality "makes *pneuma* something more like 'force' or 'energy' than a material object" (ibid). Pseudo-Galen explains it this way:

> There are two forms of the inborn *pneuma*, that of nature [*physis*] and that of soul [*psyche*]; and some [the Stoics] add a third, that of *hexis*. The *pneuma* which holds things is what makes stones cohere, while that of nature is what nourishes animals and plants, and that of the soul is that which, in animate objects, makes animals capable of sense-perception and of every kind of movement. (in Inwood and Gerson, 1997: 171)

I note here that, clearly, 'soul' is not attributed to all things, but only to animals. Unlike the pre-Socratics, the Stoics had differentiated 'soul' from 'mind', equating mind with the *pneuma* (which was in all things). Thus one does not find statements like 'soul moved all things', but rather we see an intelligent universal force which accounts for motion. Consequently, the Stoics were panpsychist but of a different type than Plato and the earlier philosophers.

In its second role, *pneuma* not only holds things together, it also makes them 'one thing'. It accounts for the unity of being. It was Chrysippus' belief that "Nature is made One by the *pneuma* which makes the Whole coherent and interacting." (Sambursky, 1959: 41). Clemens Alexandrinus reiterates this point: "[T]he tension of the *pneuma*...pervades and holds the cosmos together" (cited in ibid, p.119). The unity of a thing is described as that which 'rules' over the object, and determines its character.

This unity is a central concept in Stoic philosophy, and is given a special name, the *hegemonikon* (from *hege,* 'to lead', and *mone,* 'singular'), typically translated as 'the leading part of the soul'. Cicero explains it as follows:

> There is, therefore, a nature [i.e. *pneuma*] which holds the entire cosmos together and preserves it... For every [natural object]...is joined and connected with something else, [and] must have in itself some 'leading part', like the mind in man and in a brute beast *something analogous to mind* which is the source of its desires for things; in trees and plants which grow in the earth the leading part is thought to reside in their roots. By 'leading part' I mean that which the Greeks call *hegemonikon;* in each type of thing there cannot and should not be anything more excellent than this. (On the Nature of the Gods, 2, 29)

The *hegemonikon* is present, like the *pneuma* itself, at all levels of existence. Cleanthes argued that the sun was the *hegemonikon* of the cosmos.

The third property of *pneuma* is its inherently dynamic nature. "By virtue of its constituents [fire and air], *pneuma*, which is spatially continuous, is continuously active." (Long, 1974: 157) The *pneuma,* in fact, is the source of all motion, and takes on the role formerly held by 'soul'. "The cosmos is formed and ruled by [pneumatic] forces which activate matter in a similar way to the activation of the living body by the soul." (Sambursky, 1959: 37).

This active quality of *pneuma* is related to the fourth property as an agent of communication. Alexander Aphrodisiensis, speaking of the theory of Chrysippus, says, "[H]e assumes that the whole material world is unified by a *pneuma* which wholly pervades it, and by which the universe is made coherent and kept together and is made intercommunicating" (ibid, p.121). This intercommunication is coordinated by the singular point of the *hegemonikon:*

> The vital function of the *hegemonikon* as the central seat of consciousness, unifying all the activities of the soul and maintaining and regulating its contact with the external world, clearly defines a dual direction of communication ... It is through the incessant movement of *pneuma* to and fro between the *hegemonikon* and the surface of the body that this two-way communication is established. (Sambursky, 1959: 22).

And what exactly is 'communicated'? It is the 'heat' of the *pneuma*, its warm life energy that sustains all things. To cite Cicero: "What now remains is the [*pneuma*]; it itself is in its entirety a hot nature and communicates its salutary and life-giving heat to all other natures." (in Inwood and Gerson, 1997: 146).

Consider the parallels between these properties of *pneuma* and the characteristics of hylonoism. The hylon is a function of the structural unity of a given system of mass/energy. Objects that we perceive as 'singular' things possess a particularly intense hylon, which causes it to stand out against the background flux of matter and energy. The hylon is not a force, but rather it is a result of forces that cause a given object to persist as a coherent structure. The unity of the singular hylon has been stressed, and there is a striking parallel to the concept of the singular *hegemonikon*. In fact, I would claim that the *hegemonikon* anticipates the true essence of the concept of the hylon, and is expressed in words as well as conceivably possible, given the state of knowledge at the time of the Stoics. Both point toward a common underlying view of the nature of mind.

The *hegemonikon* is not just the 'unity of the soul'; it is a specific quality, attributed to all systems large and small, and its dynamic nature, its center of two-way exchange, captures most all the essential aspects of hylonoism. Two-way exchange of energy between parts of a system 'create' the hylon, just as the two-way exchange of pneumatic 'heat' is the central activity of the *hegemonikon*. I see this Stoic anticipation of hylonoism as a parallel to the manner in which Democritus anticipated modern atomic theory; both grasped and articulated the central concept of a modem ontological principle, and both expressed themselves in as clear terms as possible. This goes far beyond mere panpsychism as an anticipation of participatory mind; it intuits key aspects of the nature of being, and describes them in astonishingly clear terms.

6) Participatory Philosophy in the Early Christian Era

Roman civilization had incorporated many aspects of Stoic thought, and this influence extended to all realms of the empire. It is well known that the early Christian writers were aware of Stoic philosophy, and of Greek thought in general. Thus even though the emergence of the religious worldview marked a major turning point in Western Civilization, one may expect to find a substantial residuum of earlier philosophic thought.

Consider first of all the general concept of monotheism. Both the Greeks and the Romans had their pantheon of gods, but in each system there was single God-King who ruled over all: Zeus, and Jupiter (or Jove), respectively. This would indicate the need -- which is perhaps a universal need -- to see the cosmos as ultimately connected and unified, as under a 'single rule' in some sense. The inclination toward monism is a powerful force in human culture[6].

In addition, the mythological hierarchies of pre-Socratic Greece and Rome were centered on distinct 'personalities'. Each god (including the king) had unique personality traits that accounted for and explained the god's role in the natural world. This was, in a sense, extreme anthropomorphization -- the attribution of human-like qualities to the various gods of nature. It was also a reflection of the animist view that one finds in many early cultures. Thus the Greek and Roman mythologies accounted for both the presence of the numerous 'souls' in the natural world, and for an over-arching principle of unity.

The Greek philosophers reconfigured the cosmos, structuring it around a sense of order, reason, and *logos*. The gods were still there, and still were present in all things, but they ceased to have human-like personalities. Plato had his demiurge, the creator of the universe, who endowed it as a whole with reason and soul -- in order to make everything "as much like himself as possible". The demiurge then recedes from view, leaving only the world-soul remaining. The world-soul takes on the role of 'god-king', of that mind which occupies the highest station in a cosmos full of gods. Tellingly, neither the demiurge nor the world-soul have much of a personality. They are both invoked for their explanatory power and their adherence to the principle of *logos*. Thus even though the emphasis had shifted from 'personality' to 'rational explanation', the Greek worldview still accounted for both the existence of gods and for cosmic unity. And I have shown that this emphasis on reason and the *logos* continued through the Stoic tradition, and carried on within Roman civilization until the collapse of the empire in the sixth century.

By this time, Christianity and the religious worldview were becoming increasingly powerful, though it was not until 400-500 years later that they became dominant in Western culture. The religious worldview offered a new way of seeing the cosmos, one that was a kind of return to the ancient mythological scheme: the principle of *logos* had been subsumed once again by the principle of *faith*. First, there was a return to the supernatural. God and the angels dwelt, like Zeus and his cohorts, in an other-worldly realm. This resulted in a primarily *spiritual* worldview, in contrast to the primarily rational and naturalistic worldview of the Greeks. Second, there was of course God himself, who, like Zeus, signified the ultimate unity of the cosmos. Third, for both God and Zeus, their status as symbol of cosmic unity was not abstract like Plato's world-soul, but rather they, in both cases, acquired human-like personality traits, and were manifestly active in human affairs.

The religious worldview differed from the ancient mythological worldview, however, in that it created a radically new separation between the spiritual and the natural. The gods of the myths were by and large gods of nature; they existed in or controlled natural phenomena (e.g. oceans, rain, crop harvest), and they accounted for ordinary events in lives of everyday people (e.g. love, sleep, health, etc). With the new religious worldview, the gods and spirits were banished from nature. They lived primarily in the supernatural realm, and only rarely did they intervene. Only in humans was the supernatural manifest, in the form of our eternal soul. Such a picture stands in stark contrast to the polytheism of mythological Greece and to the panpsychism of the Logos period (pre-Socratic, Platonic, and Hellenistic Greece). To the extent that I am arguing for a panpsychic interpretation of the universe, the religious worldview was a step backward.

A common thread among all three eras – mythological, Greek, and Christian – is the presence of a central unifying figure. The important point is this: *What we recognize in Zeus, the world-soul, or God is the Great Mind of the Cosmos. We come to know this Mind because we are fundamentally like it.* "All minds, great and small, are alike" (Anaxagoras). This is a central thesis of hylonoism. All minds share a common process, a common basis in mass/energy, and exist in a common space, the Partimens. Also, Mind and mind exist not arbitrarily or randomly, but they exhibit a consistent nature, a real personality, which demonstrates variation and creativity within certain bounds of regularity. We know this most immediately in our own personal minds, and we therefore can extend this concept of personality to all minds, at all levels of being. *This is not naive anthropomorphism*; it is simply a recognition and acknowledgement of the conditions of the universe as perceived by human beings, expressed in the most basic human terms possible.

The Christian project was clearly less panpsychist than the Greek Logos, but it nonetheless represented an advance in two important ways. First, it returned the quality of 'personality' to the Universal Mind. As I have just mentioned, this is significant because it acknowledges that the Great Mind is fundamentally like our finite human mind. To give it all the attributes of the Christian God is perhaps superfluous, but it undoubtedly made the image more presentable and comprehensible to the common people. Second, it put forth God, in the persons of Jesus and the Saints, as divine role models for humanity. Ordinary people were exhorted to aspire to the perfect and saintly life. There was thus this element of *transcendence*, of absolution of imperfection through faith and devotion. In this sense the religious worldview took on an *evolutionary demeanor* that was lacking in the purely rational and ethical systems of the Greeks and Romans.

From its earliest days the Christian project incorporated many aspects of the Platonic, Aristotelian, and Stoic philosophies. The influence of Plato was particularly important for the early Christian thinkers, and Origen (182-251 CE) was among the first to attempt to unite Platonic ideas with the emerging Christian theology. A number of Plato's concepts were appealing to theologians like Origen, including the idea of a nonphysical world as the 'true reality' (the Forms of Plato, versus the notion of a spiritual realm), the belief in a 'creator' (the Demiurge versus God), the 'Good' (or 'God') as the highest virtue, and the immortality of the soul. Other Platonic ideas were more troublesome; among these were his intimations of panpsychism and the whole notion of a 'world-soul' as distinct from the creator.

Shortly thereafter Plotinus (205-270) developed the first incarnation of what came to be called the Neoplatonist school of thought. Neoplatonism is a broad (and ambiguous) philosophical term that encompasses a diversity of ideas, many of which incorporate elements of monotheism and are only incidentally connected to Platonism. Generally speaking we may say that Neoplatonism is a collection of metaphysical principles that works toward knowledge of the good life through an intimate contact or unification with the One, or God. This highly influential movement flourished ca. 200–550 CE, and continued to affect the thought of a number of important thinkers well into the Renaissance.

Unification with God, the highest Good, required some form of deep communication or interaction. Significantly, the Neoplatonic philosophers came to describe this process as one of *participation*, following Plato's description of the phenomenal world as existing through participation in the Forms. Plato never fully developed his notion of participation, leaving us with only a few explicit passages from works like the Phaedo and Parmenides (cf. my citations in Chapter 1). Aristotle saw this as a failing of Platonic philosophy. In the Metaphysics he observes that Plato's concept of participation is related to the Pythagorean idea of things existing through an 'imitation' of numbers – numbers being a rough analogue to Plato's Forms. Aristotle notes that, for Plato,

> the many [objects of the sensory world] existed by participation in the Forms that have the same name as they. Only the name 'participation' was new; for the Pythagoreans say that things exist by 'imitation' of numbers, and Plato says they exist by participation, changing the name. But what the participation or the imitation of the Forms could be they left an open question. (Metaphysics I, 6, 987b11-14).

The Neoplatonists sought to remedy this weakness by more fully articulating the concept of participation, occasionally employing Christian or monotheistic ideas.

Plotinus' Enneads (ca. 270/1969) have a number of references to participation, most of which are in line with the Platonic usage. In the first Ennead he writes:

> [A]ny participation in Ideal-Form produces some corresponding degree of Likeness to the formless Being There. And participation goes by nearness; the Soul nearer than the body, therefore closer akin, participates more fully and shows a godlike presence, almost cheating us into the delusion that in the Soul we see God entire. (I, 2nd tractate, sec. 2)

The third Ennead speaks of the Universe as a "participant in Intelligence and Reason" (2nd trac, sec. 2), and states that, for physical objects, "there are degrees of participation" (2nd trac, sec. 2) corresponding to the inherent powers of a thing. Plotinus continues this theme in the forth Ennead, where he says, "A living body is illuminated by soul: each organ and member participates in soul after some manner peculiar to itself" (3rd, trac, sec. 23). And the sixth Ennead includes a number of passing references, again consistent with Plato. In spite these references, Plotinus does not add significantly to the articulation of a philosophy of participation.

Porphyry (232-304) and Iamblichus (245-325) were important Neoplatonist contemporaries of Plotinus. Porphyry seems not to have emphasized the importance of participation, but Iamblichus found significance in it[7]. For him every class of being had both a pure, 'imparticipable' order and a more impure, interactive, 'participable' order that was involved in the actual coming-into-being of particular objects. He was the first to interpret participation as a literal partaking, as a taking of some essence. Things exist in a hierarchy of being, with each order possessing a participated 'form' of the (unparticipated) Form above it. As Lloyd explains:

> [E]very subsistent thing...existed...first 'imparticipably', then as the participated form which...'proceeded from' that as its 'illumination'. Any level of reality is thus connected to the one above it by containing as its highest or best feature a participated form which reflects the imparticipable substance that identifies the next higher order. (1967: 298).

Lloyd observes that this "apparent doubling" of the Forms is logically necessary if they are to both retain an absolute independence and yet function as active, participatory agents of creation.

Another early Christian theologian, Gregory of Nyssa (335-398), built upon Neoplatonic ideas; he created an intuitive and mystical theology that had close connections to Origen. Gregory's philosophy was notable in that he emphasized the process of participation with respect to the human-divine interaction, and yet he also saw it as a more general phenomenon; his system moved toward a participatory ontology in which "the underlying reality of things is their likeness to God and their participation in him" (Sheldon-Williams, 1967: 453). His early work follows standard Platonic usage, as when he writes,

> He who has purified the eye of his soul...makes of the visible object [of beauty] a vantage-point from which to contemplate that intelligible Beauty by participation in which all beautiful things are beautiful. (Treatise on Virginity, in Armstrong, 1967: 453)

And yet he also made a number of further articulations that moved beyond Plato. Participation for Gregory is a means of interaction or 'contact' with God. He states that "it [God] draws human nature to participate in its perfection" (in Danielou and Musurillo, 1961: 190), and thereby the human soul comes to know God.

Most significant is Gregory's concept of *epectasis*, or 'perpetual progress'. He believed that people continually participate in the nature of the divine, and that this participation simultaneously quenches and deepens one's thirst for transcendence. Divine blessings continually flow upon us, and the deeper our participations the deeper our rewards:

> [St. Paul] teaches us...that in our constant participation in the blessed nature of the Good, the graces that we receive at every point are indeed great, but the path that lies beyond our immediate grasp is infinite. ... [T]hose who thus share in the divine Goodness...will always enjoy a greater and greater participation in grace throughout all eternity. (ibid, pp. 211-2).

This participation in God, the Good, establishes an instance of 'positive feedback' in which the very act of participation increases one's capacity and desire for further participation:

> Participation in the divine good is such that, where it occurs, it makes the participant ever greater and more spacious than before, bringing to it an increase in size and strength, in such wise that the participant, nourished in this way, never stops growing and keeps getting larger and larger. ... [E]verything that flows in produces an increase in capacity. Thus the two are functions of each other: ... It is clear, then, how large [the potency of the soul] can become, since there is no limit to stop its growth. (ibid, pp. 62-3).

Gregory exquisitely summarizes his view as follows: "*The soul grows by its constant participation in that which transcends it*" (ibid, p. 190; my italics).

Thus Gregory envisioned a three-part process of participation, as (a) Platonic participation in a realm of Forms, (b) a means of knowledge of the divine, and (c) the means of growth of the soul. His writings are part of the era of 'middle Neoplatonism'. Late Neoplatonism is associated with the work of two other important philosophers, Proclus and Pseudo-Dionysius. Both men significantly extended the usage of the concept of participation, in the realms of traditional Greek philosophy and Christian theology, respectively.

Proclus (411-485) was a philosopher in the original Greek tradition, heading the Athenian School of Philosophy for 50 years. He developed a complex and oftentimes utterly obscure metaphysical system that emphasized the term 'participation' more than perhaps any other early Christian-era thinker. Elaborating and expanding on Iamblichus, Proclus articulated a three-part metaphysical system in which existed (1) the 'imparticipable' (the eternal Form), (2) the 'participated' (that aspect of the Form which inhered in material objects), and (3) the 'participant', or subject of participation.

References to participation occur repeatedly throughout Proclus' chief work, Elements of Theology. Roughly one quarter of the 211 propositions cite the term either directly or in the discussion. He begins the work with the proposition that "Every manifold in some way participates unity" (Prop. 1, in Dodds, 1963: 3), and continues to layout a systematic and formal articulation of his worldview. He elaborates his three-part system: "All that is unparticipated (i.e. the Forms) produces out of itself the participated" (Prop. 23), and establishes a participatory hierarchy: "All that participates is inferior to the participated, and this latter to the unparticipated" (Prop. 24). Later propositions become increasingly complex, and include such references as: "Every whole-of-parts participates the whole-before-the-parts" (Prop. 69); "[E]very particular soul participates the universal Intelligence" (Prop. 109); and "Every god is participable, except the One" (Prop. 116). Such references are not limited to Elements, and recur (less frequently) in the other works of Proclus – including, notably, his Commentary on Plato's Parmenides[8].

The last important Neoplatonist philosopher was the individual known as 'Pseudo-Dionysius' (ca. 500 CE), or Dionysius for short. This unidentified Christian theologian presented himself as the disciple of St. Paul mentioned in the Bible; Acts 17 refers to a certain Greek official called "Dionysius the Areopagite" who was converted to Christianity by Paul during his visit to Athens circa 60 CE. Dionysius' false presentation passed for truth for nearly 1000 years, and his writings influenced a number of important philosophers including Aquinas and Ficino.

Dionysius built upon the work of the earlier Neoplatonists and combined Christian theological concepts with Plato's theory of the Forms. As with the others I have discussed, he emphasized the importance of the notion of participation and its role in the relationship with the divine. The two highest Forms in the Dionysian system are 'Good' and 'Being'. The Good is identified with God, who is the 'highest Good', a "unity above being" (it is also equated with the 'One' and the 'Beautiful'). Being comes as a direct consequence of the Good and is the most fundamental form of participation in which objects partake.

His primary work, *De divinis nominibus* (On the Divine Names), describes a theory of participation not unlike that of Gregory of Nyssa. Participation takes on at least three distinct meanings: (1) It serves as a means of communication with God, knowledge of God, and ultimately is a source of enlightenment:

> The Good is not absolutely incommunicable to everything. ... [I]t draws sacred minds upward to its permitted contemplation, to participation and to the state of becoming like it. ... [Those who seek it] are raised firmly and unswervingly upward in the direction of the ray which enlightens them. (Ch. 1, sec. 2; 1987: 50).

Later Dionysius adds: "For all divine things, even those which are revealed to us, are known only through their participations" (Ch. 2, sec. 7; in O'Rourke, 1992: 7).

(2) It applies not only to mankind but to all creatures and even all material things, and is thus a universal quality of existence. All things participate in Being, as do even the other Forms (Life, Wisdom, Unity, etc.) that are the "sources" of all things:

> Everything participates in [God] and none among beings falls away. ... Being precedes the entities which participate in it. ... It is only because of their participation in Being that [the other Forms] exist themselves and that things participate in them. ... The first gift therefore of the absolutely transcendent Goodness is the gift of being, and that Goodness is praised from those that first and principally have a share of being. (Ch. 5, secs. 5-6; 1987: 99).

Using somewhat different terms, he later reiterates the point: "Just as every number participates in unity...so everything, and every part of everything, participates in the One." (Ch. 9, sec. 2; ibid: 128).

(3) Finally, participation serves as a measure of a thing's 'divinity': "The more a thing participates in the one infinitely generous God, the closer one is to him and the more divine one is with respect to others." (Ch. 5, sec. 3; ibid: 98). Overall Dionysius is less systematic and rigorous in his usage of participation than the other Neoplatonists, most notably Gregory and Proclus. But his writings have had more of a historical impact than any other early Christian philosopher because of his considerable influence on Thomas Aquinas.

The period of time between Dionysius and Aquinas – roughly 700 years, from 500–1200 CE – was an era of relatively little progress in the evolving Participatory Worldview. Then in the 13th century Aquinas (1225-74) took up Dionysius' conception of participation[9] and developed it into an important part of his metaphysical outlook.

Here I will only provide a summary of Aquinas view on participation, partly because of the strongly theological nature of his writing (my focus in this thesis is on rationalist and naturalist philosophy), but also because the topic has been given detailed treatment elsewhere[10]. Aquinas articulated three primary modes of participation. First, there is the participation of the less-general in the more-general. An example would be the participation of a species in a genera, or an individual in a species (e.g. 'man' participates in 'animal', and 'Socrates' participates in 'man'). This is a logical or definitional form of participation, based as it is on the designations of categories of being. Second is a real or ontological mode of participation in which an object takes on physical characteristics as a consequence of it participation. For example, when a lump of clay is crafted into a vase, the clay matter is said to participate in the 'form' of the vase. Third, Aquinas identifies a causal mode wherein an effect is seen as participating in its cause. This becomes significant in discussions of God as the original cause or source of things.

The most important aspect of participation is related to the concept of *esse* ('being', or 'existence'). All existing things are said by Aquinas to 'participate in *esse*', and this establishes their existence. *Esse* is a most general quality, and is neither reducible to nor dependent upon another entity; that is, *esse* cannot participate in anything else. Furthermore, *esse* is present in two forms: (1) a general mode of existence that he calls "*esse commune*", and (2) a "self-subsisting *esse*" (*esse subsistens*), of which there is only one mode, God. Only God "is" its own *esse,* and does not participate in *esse.*

So any particular being (*ens*) participates in existence (*esse*). Since *esse* consists of the two manifestations (*commune* and *subsistens*) this means that any thing participates at once in both *esse commune* ('being-in-general') and *esse subsistens* (God). But also we know that each material thing (*ens*) is not 'its own' *esse,* and this requires that the thing have a separate 'essence', or form, which is separate from the *esse* in which it partakes. Therefore each material object is a *composite*: it consists of (a) its form or essence, and (b) its share of *esse.*

Given this, the concept of participation raises a potentially major problem for Aquinas. If 'participation' is to be understood literally as a 'taking of some essence', then participation in God (*esse subsistens*) means an incorporation of the divine essence, which Aquinas saw as the threat of pantheism – i.e. all things are God. In response Aquinas decided that participation exists in two different ways: first in the literal 'partaking' sense, which is how things participate in *esse commune*; and second, as a *likeness* or *similitude*; this is how things participate in God – they are 'like' him in some limited and finite way, but not in themselves divine. So each thing (*ens*) can be said to 'have' *esse* but only 'resemble' God.

Wippel (1987; 2000) sees participation as the core of Aquinas' metaphysics, and hence as central to his entire philosophical system. This fact alone is of considerable significance, considering that Aquinas has become one of the most important philosopher/theologians of Western civilization. That the concept of participation was central to Aquinas' thinking further indicates the growing influence of the philosophy of participation.

Apart from Neoplatonism, the Middle Ages and early Renaissance were dominated by the influence of Aristotelian thinking. Even Aquinas, who incorporated some Platonic themes via Pseudo-Dionysius, shows a marked bias towards the ideas of Aristotle. Perhaps this is because Aristotle's worldview posed no threat to the basic Christian principles, whereas Neoplatonism (and Stoicism) were more troubling. More to the point, Aristotle was critical toward the role of participation, and his theory of inert matter was clearly opposed to a panpsychic interpretation of nature. Aristotelian influence reached its peak in the scholasticism of the 11th – 14th centuries, which dominated philosophical discourse of the time.

From the time of Aquinas, Christian mystics like Meister Eckhart (1260-1328) advocated a form of participatory thinking, in that God was seen not as distant and remote but as immanent in humanity and in the natural world. Knowledge of God was achievable through deep participation, through a mystical union with him. Participation was seen as emotional, sensual, and intuitive rather than merely as a rational or intellectual matter. The very concept of 'knowledge' was changed to include the totality of human abilities. In our current age dominated by rational thought, the approach of Eckhart continues to appeal to those who seek a more comprehensive way of relating to the cosmos.

In the 1300's and 1400's, thinking started changing in Europe. Humanist thought began to emerge and to question some of the basic principles of the religious worldview.

Boccaccio and Petrarch played important roles in this process, but we may perhaps single out Marsilio Ficino (1433-99) as a turning point of sorts. In one sense, he was quite medieval; his work on uniting aspects of Christianity with Neoplatonism was reminiscent of Plotinus and Augustine, and he tended toward a mystic conception of knowledge of God. On the other hand, Ficino was a leading humanistic thinker, a systematic thinker, and believed that the human soul deserved a central role in the cosmos.

Ficino is symbolic of the shift that was occurring from the religious to humanist/scientific worldview. He saw religion not as supreme holder of knowledge and wisdom, but rather as requiring a philosophical dimension; in the words of Burroughs, "for Ficino philosophy must be religious, religion philosophical." (1948: 187). Ficino constructed a five-level hierarchy of the cosmos[11] which placed the 'soul' at the very center. Soul, for him, is a dynamic quality that exists at all levels of reality, including that of the cosmos as a whole – a reinterpretation of the world-soul. As Kristeller explains it, "[Ficino] is convinced that the universe must have a dynamic unity, and that its various parts and degrees are held together by active forces and affinities. For this reason, he revived the Neoplatonic doctrine of the world soul..." (1964: 43). Here we see evidence of influence by Plato's panpsychism, as well of the Stoic doctrines of the 'active' and of the *pneuma*'s dynamic unity.

Though not a panpsychist, Ficino clearly had inclinations toward what we now would call participatory thinking. Not only was soul (in the sense of the cosmic soul) in all things, but he saw 'mind' and human emotion as playing an active role in shaping reality:

> Now since for Ficino *'thought' has an active influence upon its objects*, and since love...is an active force that binds all things together, and since the human soul extends its thought and love to all things...soul becomes...the center of the universe. (Kristeller, ibid., my italics)

Participatory philosophy was turning away from the overbearing influence of religious thought and toward humanity and nature. The concept of 'soul' was shifting to the concept of 'mind'. Panpsychism was reemerging as a key element of philosophy, some 1200 years after the waning of Stoicism. But now it was to have a naturalistic, and even an empirical, basis.

7) Renaissance Naturalism of the 16th Century

Beginning with the Renaissance, a new worldview began forming. The religious worldview had reached its peak of influence, and its position as the leading social influence was soon to decline. The new worldview was a system based not on divine scriptures, but on empirical observations of nature and on rationalist introspection into the essence of reality. It saw the world as regular, rational, and knowable. It applied new techniques in mathematics to natural phenomena, and perceived a new kind of order in the universe. The regularity and predictability led to a new phenomenon: mankind's tendency to control and manipulate the natural world. All these qualities can be summed up in what I have called the Mechanistic Worldview. Its central metaphor was to see the cosmos as a *clockwork mechanism* – consistent, predictable, and comprehensible, even though (perhaps) constructed by a Supreme Creator whose nature was necessarily of an entirely different sort.

As I have argued earlier, all throughout the emergence and rise to power of the Mechanistic Worldview there was a persistent countercurrent of thought that was non-mechanistic. This line of thinking saw the universe as alive, as animated throughout, as possessing mind, sensitivity, and awareness. Empirical science did nothing to dissuade panpsychist philosophers from this view, and in fact more often served to strengthen it. Even some of the founders of mechanistic philosophy, those thinkers most associated with advancing this new worldview, harbored doubts about viewing matter as inherently dead, inert, and insensate. And as before, I will demonstrate that the development of participatory philosophy frequently went hand-in-hand with panpsychist sympathies.

The Renaissance was certainly a 'rebirth' of philosophy. The religious worldview had begun to play itself out as the dominant interpretation of the universe, and a new system based in nature and mankind was emerging. Religion was still important, of course, but it was proving increasingly unable to explain the events of the natural world. Ficino kept God in his system, but placed the human soul at the center, and described it as radiating out into all aspects of reality. Similarly, the other central thinkers of the 16^{th} century denied not God but rather religion's claim to sole purveyor of truth.

The forefront of Renaissance philosophy occurred in Italy; new perspectives took root and flourished. This 'new philosophy' of Italy is typically known as *Renaissance naturalism*. Five of the most important philosophers of this era – Cardano, Telesio, Patrizi, Bruno, and Campanella – were Italians. All shared a disdain for the standard theology, all opposed the dominance of Aristotelianism and scholasticism, and all looked to nature for insights into reality. All were panpsychists. And with perhaps the exception of Telesio, all had significant ideas about the concept of participation, and they also developed theories of mind that showed interesting anticipations of hylonoism.

Girolamo **Cardano** (1501-76) was the first notable philosopher in over a millennium to put forth an unambiguous panpsychist philosophy. A student of Stoicism, he also investigated Platonic and Aristotelian philosophy, eventually siding with Plato. Thus it is perhaps not surprising that he adopted a Platonic view of the world-soul, and even extended the basic panpsychist insights of Plato.

The concept of *unity* was central to Cardano's philosophical system. Everything ultimately is One, and the oneness of all reality is its central defining characteristic. The fact that we see distinct objects around us is explained by a three-part 'system hierarchy'. First, all things are parts of the whole, the One. Second, all things are by nature composite, and consist of various sub-parts. Further, any given object is a 'one' to its parts, just as the One is the unity to all the parts of reality. Thus, all distinct objects are simultaneously: (1) a part (of the whole), (2) a unity in themselves, and (3) a composition of sub-parts[12].

This hierarchy of 'systems within systems' was reflected in his view of the human being as a 'microcosm'. Cardano saw in the unity of the human a reflection of the unity of the universe at large. He envisioned similar principles applying to the organization of both the human and the universe; by studying one, a person could learn about the other – and in fact learn something about all natural systems. Commentator Markus Fierz puts it this way: "One studies the movement of the stars in order to divine human fate. One compiles the properties of animals, plants, even stones hoping to procure from them medicinal remedies." (1983: xvii). All natural systems are linked, and share common core properties. This systems-view of mankind and nature is a remarkably modern perspective, and distinguishes Cardano from his medieval predecessors and peers.

Cardano felt that a fundamental principle was necessary to maintain the unity of the One and its many subordinate unities. This principle, he believed, was 'soul' (*anima*); and the particularly human form of this principle he recognized as 'mind'. Furthermore, soul is identified with the whole of the cosmos (the world-soul). If soul is the unifying principle, then it must likewise be *present in all unities* large and small. This recalls the Stoic insight of the *pneuma* as a unifying force in all objects. Cardano takes Plato's intuition about the soul of the world and formalizes it, making it a principle of unity, which then takes on a causal role in all levels of unity. Plato saw 'gods in all things', but did not see them as a consequence of common principles of organization that act at all levels of existence.

With the idea of 'soul' as the unifying principle in all things, Cardano developed a relatively pure and straightforward panpsychism. In his work *De subtilitate* (On Subtlety, 1550), he explains the central role of *anima*: "[Material] bodies...are generated from matter and form, and are controlled by the *anima*, which in the higher types of beings is mind..." (1550: 117). Again we see the connection between 'soul' and 'mind', with mind being a rarefied form of the more general quality of soul. As with the Greeks, Cardano sees soul as the causal source of all motion in the world: "[U]niversally there must exist a certain *anima*...because a source of motion seems to exist in every body whatsoever..." (ibid, p. 87).

Cardano's other Greek influences also reveal themselves in his writings. For one, there is his theory of 'heat' and 'prime matter' that is strongly reminiscent of the Stoic ideas of 'active' and 'passive'. (Incidentally, notice again the connection between the term 'heat' and the concept of energy; ideas of energy and force frequently recur in the philosophy of the panpsychists). Stoic influence is also found in Cardano's reference to the *pneuma*, the 'vital spirit' that circulates in the animal body and gives it life. Empedocles' conception of Love and Strife as the two fundamental forces in the universe is reflected in Cardano's 'sympathy' and 'antipathy': Fierz says, "The main principle underlying [hidden] relationships is the sympathy and antipathy of all things, which partake [i.e. *participate*] in a common life." (1983: xvii). Cardano makes a slight break with Empedocles, Aristotle, and the Stoics, arguing against the designation of 'fire' as an element. To him, fire is heat, the active principle, which acts on the 'passive' to produce form. This is a general ontological principle, and hence, "all permanent bodies, including stones, are always slightly moist and warm and of necessity animate." (1550: 66).

Bernardino **Telesio** (1509-88) developed a panpsychist philosophy that had a lasting influence in Western philosophy, primarily through the works of Bruno, Campanella, Bacon, and Hobbes. His system was based, like Cardano's, on a return and refinement of the ideas of the pre-Socratics. He challenged Aristotle's duality of 'matter' and 'form', arguing instead for an emphasis on matter and *force*.

Like Empedocles, Telesio sees two fundamental and opposing forces in the universe, an 'expanding' and motive principle that he calls *heat*, and a 'contracting' principle that he calls *cold*. These forces act on and shape the 'third principle', passive matter, which is associated with the Earth. Thus, for Telesio all things around us consist of an active 'energy' factor (in the heat/cold principle), and a 'mass' factor (in the passive matter of the earth). As he rather poetically says in *De rerum natura*, "all things [are] made of earth by the sun; and that in the constitution of all things the earth and the sun enter respectively as mother and father." (1586: 309). Once again we find an emphasis on the concept of energy as a key feature of the material world -- an emphasis that originated some 2000 years earlier in Heraclitus' *arche* of fire.

The two forces of heat and cold also had the notable property of *perception*. Heat sought to 'stay warm' and cold sought to 'stay cool', and this tendency Telesio interpreted as a kind of sensation or knowledge. And since heat and cold inhered in all things, all things shared in this ability to sense. Thus his position is sometimes referred to as *pansensism*, a particular form of panpsychism.

Francesco **Patrizi** (1529-97) also sought to undermine the dominant Aristotelian scholasticism, and place greater emphasis on Plato's philosophy. His chief work, *Nova de universis philosophia* (New Philosophy of the Universe, 1591) laid out a complete cosmological system, and introduced into the Western vocabulary the term 'panpsychism'[13].

Like Ficino, Patrizi creates a hierarchical system of being, though with nine levels[14] instead of Ficino's five. Both men placed soul (*anima*) in the center of their hierarchies. Patrizi's nine levels are deeply interconnected, in a manner that Brickman describes as fundamentally *participatory*:

> These nine grades are linked by a process of 'partaking of one another' – *participatio*. This 'partaking' [Patrizi] describes as an 'inter-illumination', through which beings are illuminated, come into existence, and are known. ... Every grade partakes of each of those above it...and is also partaken of by each grade below it... Each grade...is [at once] a 'partaker' (*particeps*), and is 'partaken of' (*participatus*). (1941: 34)

Participation is thus described, literally, as an 'en-lightening' process, and is deeply associated with the luminal aspects of the cosmos.

With soul at the center of this participatory hierarchy, it occupies a key role in mediating between the spiritual (four upper grades) and earthly (four lower grades) realms. It is clear that soul, in the form of the world-soul, penetrates all levels of being. The key question, as before, is whether the individual objects of the world possess souls in themselves (true panpsychism), or are merely an extension of the one world-soul.

Patrizi clearly endorses the former view. He sees 'soul' as a manifold entity, present both as distinct individuals and as united in the comprehensive world-soul. Kristeller informs us that "Patrizi does not treat the individual souls as [mere] parts of the world soul, but believes, rather, that their relation to their bodies is analogous to that of the world soul to the universe as a whole." (op. cit., p. 122). In the words of Brickman, soul is "both [unity and plurality], with the many contained in the one." (op. cit., p. 41).

Giordano **Bruno** (1548-1600) looked to the heavens for the basis of his philosophical system, and created a vast and articulate vision of the cosmos. He combined the insight of Lucretius – that the universe was infinite – with the recent theory of Copernicus – that the sun was at the center of the solar system – and produced an astonishingly modern picture of the universe, comprising infinitely many solar systems not unlike our own.

Though bordering on heresy, Bruno argued that in fact his vision had support from standard theology. Since God was an infinite being with limitless power, only an infinite physical universe could do justice to him. A finite cosmos would imply something less than perfection, a kind of limit to God's power. On the other hand, this had a negative implication: if the universe were infinite, this would imply that there was nothing 'beyond' it, no special space or realm that was unique to the divine. Therefore, the divine realm must *be* the universe. As Ingegno says:

> By linking the world necessarily with the divinity and vice versa, the divinity is established as that which is all in all and in everything. It cannot be 'elsewhere', since...'elsewhere' does not exist. (1998: xx)

Thus, God is somehow both 'the cosmos itself' and a transcendent being of unlimited power. Read in the first sense, Bruno is pantheist; in the second, he is a panentheist. Scholars are still divided as to which interpretation is more correct[15].

Bruno's view of 'the cosmos as divinity' is important in the history of the Participatory Worldview. Ever since Plato and Aristotle there had been a cosmic dualism in which the celestial realm was seen as fundamentally different in nature than the sublunary (earthly) realm. This necessitated an ontological schism in mankind's relationship with the universe at large. All varieties of intermediary systems were concocted to connect the human with the divine. Now with Bruno and his infinite universe, he has found a way to naturally and logically reunite the two; he has issued a "call for a healing of the division between nature and divinity decreed by Christianity" (ibid, p. xxi). Calcagno sees in this an early anticipation of present-day environmental philosophies; he refers to Bruno's "effort to reattach the self to its broader natural context – something perhaps which eco-philosophy is attempting to achieve [today]." (1998: 208). In any case, it is clearly a step at reinserting humanity into the natural scheme of things, and it makes the human a more natural participant in the cosmic order.

If the universe is infinite and all-encompassing, then clearly the universe must be seen in a fundamental sense as a *unity*. We saw the same emphasis in Cardano. In Renaissance Italy one finds the emergence of the concept of *naturalistic holism*, of seeing the cosmos as a naturally unified system. This kind of holism is a new feature of the larger stream of participatory thinking, and supplements the panpsychist element. From this point on, holism is an almost universal feature of participatory philosophy.

Bruno's panpsychism is developed primarily in his two dialogues *De la causa, principio, et uno* (Cause, Principle, and Unity), and *De l'infinito universo et mondi* (On the Infinite Universe and Worlds). Like the other Renaissance naturalists, Bruno endorses the idea of God as a world-soul, and then explains that the general concept of 'soul' must adhere in everything, if only to maintain a consistent ontology. He states, "[N]ot only the form of the universe, but also all the forms of natural things are souls" (1584a: 42). Like the Greeks, he effectively equates life and soul, seeing them everywhere: "there is nothing that does not possess a soul and that has no vital principle" (ibid: 43). Soul is seen not as identical with being, but rather as an element or an aspect of all material objects:

> All things, no matter how small and miniscule, have in them part of that spiritual substance... [F]or in all things there is spirit, and there is not the

> least corpuscle that does not contain within itself some portion that may animate it. (ibid: 44).

Summarizing Bruno's panpsychism, Kristeller writes: "For [Bruno] all things are animated by the world soul, and all matter is everywhere permeated by soul and spirit." (1964: 133). Thus it is not entirely clear to what degree the soul of individual things is truly independent of the world-soul. Bruno seems ambiguous, and perhaps with good reason; hylonoism offers to explain this ambiguity. Hylonoism argues that things are both independently minds *and* simultaneously participants in higher-order mind.

* * * * *

To continue this idea, let me briefly reexamine the philosophy of the first four Renaissance naturalists in light of hylonoism. There are a number of striking similarities, particularly with Bruno. This I take as evidence of a common perspective on the nature of reality. Hylonoism sees the world as an animate, participatory, holistic realm, and thus one should expect to find correlations with the similar views of the Italian naturalists. Such an exercise sheds light both on their views and on my theory.

Cardano was a mathematician as well as philosopher, and thus it is not surprising that he should see the world from a mathematical perspective. His system of a *three-part hierarchy* is significant because it links all levels of being in a common framework. Recall that for Cardano all things (1) are composed of parts, (2) are unities in themselves, and (3) are parts of a larger whole (with the possible exception of the cosmos). Everything is linked to other systems, those both 'above' it and 'below' it. The 'below' is an internal structure, and the 'above' is an external structure. Any point in the chain from (presumably) atom to cosmos is linked to both an internal structure and an external structure. And all structures are ultimately connected in the One that is the cosmos.

Furthermore, every link in this chain is a *unity in itself*, resulting from the presence of a soul – interpreted as a generalization of 'mind' – acting in that link. As with the Stoic *pneuma*, the soul integrates each thing individually, makes it one, and makes it whole. And as with hylonoism, the hylon is the unity of the object, existing more or less intensely *depending on the degree of participation* between the elements. The difference of course is that the hylon is not a 'force', but rather the measure or indicator of unity.

So Cardano's system can be seen as a nested hierarchy of 'souls within souls', stretching from the very minute to the world-soul. This holds true for the human soul no less than for every soul (one recalls Nietzsche's proclamation that "our body is only a social structure composed of many souls [minds]" – 1889, sec. 19). This picture of 'nested souls' corresponds closely to the concept of 'nested minds' offered by hylonoism. In hylonoism, for example, the atom possesses a mind (hylon), and the molecule composed of many atoms possesses it own hylon, though in conjunction with the hylons of the atoms. So too does the protein which is composed of many molecules. The layers exist *hierarchically* and *simultaneously*. Every level of structure, from lowest to highest, has a dynamic description that can be captured in the concept of the hylon – which has the characteristics of mind. Cardano seems to have grasped this insight and expressed it in the terms of his day.

Finally, I want to note one other observation. Recall that I have argued that the hylon is inherently connected with all structures of matter, that this singular point of mind is associated with all physical systems, and yet the point itself dwells in a non-physical space that I have called the Partimens. Mind is connected to matter, but yet set apart. Cardano makes a very similar observation of soul. We saw previously that *anima* (or mind) was a basic principle of all bodies. He adds, "Moreover, *anima*, matter, and form all necessarily *have* body, and yet *anima* does not seem to be a *part* of body." (1550: 117, my italics). Soul (like matter and form) is connected to material objects, but is uniquely immaterial. Cardano does not tell us why this is so; hylonoism, on the other hand, gives us a detailed description of the unity of mind, and how it is connected to matter yet apart from it.

Telesio has only indirect connections to hylonoism. Perhaps the most significant is his conception of *memory*. Telesio's 'soul' was very similar to the *pneuma*, except that it had the additional important quality of memory. Kristeller notes this same point: "[soul] possesses, besides sensation, the faculty of memory or retention". (1964: 100). This is significant because it is the first instance of memory playing an important role in a metaphysical system. This can be seen as an early anticipation of Bergson's philosophy, and even of the concept of memory as defined by chaos theory -- recall that all chaotic systems are inevitably changed by physical interaction; i.e. the path of the hylon through phase space is forever altered by even the smallest influence. A chaotic system 'records' all interactions (in the sense that the system evolves differently than if the interaction had not occurred), but does not necessarily have the ability to 'recall' a given experience. It is not clear how Telesio intends us to take his concept of memory -- as 'persistent record of experience' (as in chaos), or as 'ability to recall'. But the mere fact that he recognized the metaphysical significance of memory is notable.

Patrizi has no significant correlation with hylonoism, so I move on to Bruno. There are three important aspects of Bruno's thought that intersect with hylonoism. First is his concept of the '*monad*', and its relation to the concept of the hylon. Bruno is clearly an atomist, and believes that there exist some ultimately small and simple elements of matter; he refers to these variously as 'atoms', 'minima', or 'monads'. As it turns out, Bruno is not entirely clear or consistent in his definition of these monads, hence we see confusion on the part of modern commentators. Sometime the monads are material entities ("the substance for the building of all bodies is the minimum body or the atom" - *De minimo*, cited in Singer, 1950: 74). Other times they are something more ephemeral and mysterious; Singer describes them as "a philosophical rather than a material conception and [they] have in them some of the qualities of the whole" (ibid: 72). Hoeffding states that monads are "also active force, soul, and will." (1908:138).

Consider Bruno's own words on the matter: "Here is the monad, the atom: and the whole spirit extending hence upon every side; *it is without bulk*, its whole essence constituting all things by its symbols. ... For it is the prime basis of all things." (*De minimo*, cited in Singer, 1950: 74; my italics). Elsewhere Bruno describes monads as "neither discrete nor continuous; but as forming a single continuum..." (*De l'infinito*, cited in ibid: 73). Certainly rather unusual and paradoxical things.

Interestingly, the monad is not only an ultimate element of smallness; it is more generally a *unity*, and may equally apply to large-scale objects. Hoeffding elaborates: "the sun with its whole planetary system is a minimum in relation to the universe. Indeed, even the whole universe is called a monad. ... [T]he world-soul too, even God himself, is called a monad." (1908: 138-9).

Bruno is often credited with creating the concept of the monad, but the term actually goes back to Plato, and perhaps before him to Pythagoras (more on this when I discuss Leibniz). We know this not directly, but through Aristotle. In De anima Aristotle discusses Plato's theory of mind, and notes that for Plato, "Mind is the monad." (404b22). The reference is to Plato's theory of numbers, and his assignment of 'mind' to the number one – mind as a singularity. This follows from the word 'monad', which comes from *monas*, 'unity'. As a neo-Platonist, it would not be surprising if Bruno in fact picked up this term of Plato's, and elaborated upon it. The fact that mind is seen by Plato as a unity is perhaps no great insight; even in folk psychology, the unity of the ego is well-recognized. What is new – and this is to Bruno's credit – is seeing mind not merely as a unity, but as a *point-like* unity. This is something new and unexpected. And it is of course notably consistent with the hylonoetic interpretation.

The hylon is the result of 'active force', representing the soul/mind of the system; it is "without bulk"; it exists in 'different degrees', applies to all systems large or small, and represents the wholeness or unity of a system. As I interpret Bruno, he had two different conceptions of 'singularity' in mind, but was unable to differentiate them. On the one hand he had Democritus' material atoms that compose the physical world. On the other he had an *intuitive idea* of the unity point of the soul/mind. Here were two 'infinitesimal points' that somehow belonged to reality, were clearly related yet not identical. In the terminology of hylonoism, we can now distinguish them; atoms have hylons, but atoms are not themselves hylons. This perhaps was the source of Bruno's confusion.

The second important feature of Bruno's philosophy (with respect to hylonoism) was his view that 'souls' overlap and interpenetrate with one another, and with the universe as a whole – not unlike Cardano's nested souls. Again this relates to hylonoism, where each hylon is seen as inextricably linked with all other parts of the universe, and which is part of a multi-layered system. Bruno is quite clear on this matter:

> It is manifest...that every soul and spirit hath a certain continuity with the spirit of the universe. ... The power of each soul is itself somehow present afar in the universe [and is] exceedingly connected and attached thereto. ... [T]he innumerable spirits and souls diffused throughout the same space interfere not at all with one another, nor doth the diffusion of one impede the diffusion of the infinity of others. (*De magia*, cited in Singer, 1950: 90-1).

Singer even describes this inter-diffusion in terms of *participation*: "the World Soul too is for Bruno an infinite continuum in which all things partake" (ibid). And Hoeffding relates a similar structure within the monads (atoms) themselves; he writes that "[Bruno] conceives atoms as being of different degrees, and atoms of one degree may include atoms of another." (1908: 138).

Finally, the third connection to hylonoism is found in Bruno's theory of matter. He sees matter as one substance that exhibits two modes: 'power' (*potenza*), and 'subjectivity' (*soggetto*). The power aspect of matter is revealed in its potential to act, i.e. to exist, or to be. 'Being' is power, and power is the 'material aspect' of matter -- a clear connection to the concepts of energy that we discussed earlier. The hylon is intimately connected with the 'power' (energy) of a given system, and in fact the power determines the intensity of the hylon and the characteristics of the quasi-attractor ('personality'). Bruno's other mode, subjectivity, can be seen as a manifestation of the soul in matter. This subjectivity determines the inherent nature of a thing and distinguishes it uniquely from all other things -- much like the virtual attractor. And like the hylon, subjectivity for Bruno is something incorporeal. In short, the *potenza* and *soggetto* represent the 'physical' and 'mental' modes of matter, respectively. Such a dual-aspect ontology is clearly compatible with a hylonoetic interpretation, and it anticipates the important advances by Campanella and Spinoza.

8) Campanella and the Transition to the 17th Century

The last of the five Renaissance Naturalists was Tommaso **Campanella** (1568-1639). Born in the 16th century, his thought and writing are perhaps more suited to the 17th; they are both the culmination of Italian Renaissance thought, and the immediate forbearers of the more rigorous philosophical developments of the new century. Campanella's contribution to participatory philosophy is difficult to underestimate, and I devote this final section entirely to his ideas.

Campanella made the first significant advancements in participatory philosophy in his development of *participatory ontology,* and *participatory epistemology*. Like the other Renaissance naturalists, he emphasized an empirical approach to knowledge, but not in the shallow sense of the British empiricists. Rather, he combined experiential knowledge of nature with metaphysical 'first principles' to form a complete philosophical system, in which a thoroughly participatory theory of knowledge was central. Before elaborating on this, I want to briefly discuss Campanella's theory of "primalities" and its relation to his panpsychism.

Campanella's doctrine of the primalities is one of the most original elements of his philosophy, and something that pervades his entire system of thought. This doctrine is a *participatory ontological theory*. It claims that the essence of being consists of three fundamental principles: *power*, *wisdom* (or knowledge, or sense), and *love* (or will). These three are found in all things, from the humblest rock to God himself.

'Power' (*potentia*) has for Campanella three connotations: (1) the power 'to be' (*potentia essendi*), (2) the power 'to act' (*potentia activa*), and (3) the power 'to be acted upon' (*potentia passiva*). The power 'to be' is first and foremost of these, as it is the source of all existence; without the *potentia essendi*, a thing simply would not exist. Furthermore, existence demands the on-going presence of this power in order to allow persistence through time; this is a power that "is needed for being" (Bonansea, 1969: 150). The powers 'to act' and 'to be acted upon' are related to Campanella's theory of knowledge, and involve the ability to communicate the likeness of one thing to another, as I will discuss shortly.

There are two important points here. First, the usage of power as the preeminent principle of existence represents an advance from the Telesian conception of 'heat' and 'cold', but retains the essential reference to the idea of energy. And in fact, the terms 'energy' and 'power' were virtually synonymous in the 16th century, not having yet the notion of power as 'the time rate of change of energy'. Also, the *potentia essendi* has an intriguing connection to very modern theories of existence, particularly the idea of a "dissipative structure" as an entity that requires 'power' to maintain its existence. More on this later.

Second, Campanella's theory of power draws an interesting parallel to my own three-part conception of 'participation' (reference Chapter 1). The powers 'to act' and 'to be acted upon' align very nicely with participation as giving up something of oneself (*output*, as I worded it) and participation as receiving something from another (*reception*). My third usage was participation as incorporating the thing received into one's own being, possessing it, and becoming transformed by it -- participation as a state of becoming. This is related to Campanella's *potentia essendi*, as we shall see in the discussion of his epistemology.

The second primality is *wisdom*, or *knowledge*. Campanella argues that because all things sense, they therefore can be said to 'know', and consequently possess a kind of wisdom. First and foremost, things know themselves. Each thing knows of its own existence, and its own persistence over time:

> All things have the sensation of their own being and of their conservation. They exist, are conserved, operate, and act because they know. (1638, cited in ibid: 156).

Hoeffding elaborates: "Every individual being has an 'original hidden thought' of itself, which is one with its nature." (1908: 153). This, then, is the basis for Campanella's panpsychism. We see the same idea, very explicitly, in the subtitle of his work *De sensu rerum*:

> A remarkable tract of occult philosophy in which the world is shown to be a living and truly conscious image of God, and all it's parts and particles thereof to be endowed with sense perception, some more clearly, some more obscurely, to the extent required for the preservation of themselves and of the whole in which they share sensation. (1620; cited in Bonansea, 1969: 156).

Quite a 'remarkable' subtitle, and one that captures many aspects of his philosophy in a single sentence.

Campanella offers a number of arguments in support of his panpsychism as embodied in the primality of wisdom. Like Telesio, he argues that 'like comes from like', i.e. that 'emergence' is impossible:

> Now, if the animals are sentient...and sense does not come from nothing, the elements whereby they and everything else are brought into being must be said to be sentient, because what the result has the cause must have. Therefore the heavens are sentient, and so [too] the earth... (1620, cited in Dooley, 1995: 39)

He also makes a theological argument for his view. Campanella claims that, in the words of Bonansea,

> all beings...carry within themselves the image or vestige of God and are essentially related to one another. ... [God clearly possesses sensation and wisdom, and so] sensation is therefore to be extended to all beings. (1969: 157).

It is significant that Campanella sees all things as *participating* (his word) in God, and thus sharing his qualities. This argument is again employed in reference not to just wisdom, but all three primalities: "Campanella holds that God...in effusing Himself into creatures, communicates to them power, knowledge [wisdom], and love, so that they may exist." (ibid: 145). It is interesting that Campanella, a devout Christian, would look to God as justification for his panpsychism. Perhaps he thought this would placate the Inquisition. Unfortunately, the Church was beginning to feel the pressure of the new naturalist philosophy, and so it struck back hard. As we know, Bruno was burned alive in 1600, and it was at about the same time that Campanella, at the age of 32, was imprisoned by the Inquisition; thus began a 27-year prison term for his beliefs. Fortunately for posterity, he was able to continue writing, and even to smuggle out works for publication by friends and supporters.

Campanella's third primality, *love*, is a consequence of the primality of wisdom; things 'love' existence, and such love follows naturally from self-knowledge. In *Metafisica*, he explains it thusly:

> Beings exist not only because they have the power to be and know that they are, but also because they love [their own] being. Did they not love [it], they would not be so anxious to defend it... All things would either be chaos or they would be entirely destroyed. Therefore love, not otherwise than power and wisdom, seems to be a principle of being... (1638, cited in ibid: 162).

With this background in place, we can now examine Campanella's participatory epistemology. First, he emphasizes that the three primalities are of a deeply participatory nature, each intermingled and overlapping the others. In his writings there is repeated reference not only to 'participation', but to an even stronger term: *toticipation*, or 'total and complete participation'. In toticipation, the three primalities form a 'supreme unity', not unlike the Holy Trinity. Bonansea describes this condition as "not one of [mere] participation...but one of toticipation and coessentiation, so that one primality is totally and essentially communicated to another." (ibid: 147).

The primality of knowledge acts through the primality of power. The power 'to be acted upon' represents the reception of an 'essence', the transfer of something from the object to the knower. The object is able to surrender this essence by its power 'to act'. This essence is captured by the knower, incorporated into its being, and is *thereby changed. It is this change that constitutes knowledge.* Campanella is eloquent: "Every sense is a change in the sentient body." (1620, cited in Dooley, 1995: 49).

This change is not arbitrary. By incorporating an essence of the object, the knower becomes *like the object.* An *assimilation* occurs. Consider a simple example: how does a child come to know fire? He places his finger near, feels the heat, and recoils in pain. He learns about fire by literally 'becoming hot'. Heat is radiated from the flame to his body, and in a small way, he becomes like the fire. The heat energy is transferred to him, incorporated by his nervous system, and changes him – permanently. He now 'knows' fire in a deep sense, and will likely not forget it.

Thus, 'knower' and 'known' merge -- at least in part. To know something is to *become* it: an epistemology of becoming. Campanella captures this concept in his famous phrase *Cognoscere est esse* ('to know is to be', or 'knowing is being'). I know something only to the extent that I become it, and I become it by incorporating some essence of it. This insight, as I have mentioned, goes all the way back to Empedocles and his pronouncement that *'like knows like'* – "for by earth we see earth…". This is truly *deep participation*; a tangible, even visceral concept of knowledge.

Cassirer notes that such a participatory epistemology entails a joint sharing of a common essence, and that furthermore a panpsychist theory of mind naturally follows. He writes:

> [T]his unity [of knower and known] is only possible if the subject and object, the knower and known, are of the same nature; they must be members and parts of one and the same vital complex. Every sensory perception is an act of fusion and reunification. We perceive the object, we grasp it in its proper, genuine being only when we feel in it the same life,

> the same kind of movement and animation that is immediately given and present to us in the experiencing of our own Ego. From this, Panpsychism emerges as a simple corollary to [Campanella's] theory of knowledge... (1927/1963: 148)

There are intriguing comparisons between Campanella's *Cognoscere* and Descartes' *Cogito, ergo sum*. The *Cogito* informs us that thinking precedes being; first, I think -- then, as a consequence, I establish my existence. In other words, thought entails being. On the face of it, the *Cognoscere* says something very similar: that 'knowing' really means 'being' (more precisely, 'becoming'). But the context is vastly different. Descartes gives us a static statement of ontology; being is fundamentally thinking. Campanella gives us a dynamic picture of *change*, one that is in fact more complex: things exist; by virtue of existence all things have the power to 'know'; and this knowledge is achieved by assimilating and becoming like the thing known.

Furthermore, implicit in Descartes' statement is his ontological dualism of mind and body, and his focus on the human to the exclusion of all other forms of being. Whereas with Campanella we find an integration and even identification of thought and being, and we find this occurring in all things in the universe. In fact, Campanella places himself firmly in the tradition of Parmenides, and provides the first intelligible elaboration of the Parmenidean identity of Thought and Being.

Campanella was 28 years the senior of Descartes, and naturally developed his views first. *De sensu rerum* was in print some 21 years prior to the Meditations, and we know that Descartes was influenced by Campanella; as Headley says, "Descartes read more of Campanella than he would ever wish to admit" (1997: 90). It thus seems likely that Descartes drew inspiration from Campanella. Even so, the distinction is clear. Descartes opted for a distinct dualism confined to the human species, and Campanella chose to articulate a participatory panpsychism in which knowing was equated to being.

Thus we see that for Campanella, knowledge is assimilation, sympathy -- even empathy. Campanella's is a sympathetic world, one which we come to know only through our participation. Headley, paraphrasing Cassirer, puts it very well: "The limits of one's sympathy for nature become the limits of one's knowledge of nature." (ibid: 163). For any given being, whether human or non-human, living or non-living, *its degree of sympathy determines and defines its world.* Only to the extent that we sympathize with nature can we come to know nature.

There is one important aspect of Campanella's system that he fails to develop sufficiently, and that is the idea of *reciprocity*, or *exchange*. He lays out a cosmos in which all things have sense and knowledge, and he describes how the knower assimilates some essence of the thing known; the knower 'knows' by becoming changed, by becoming 'like' the known. The implication is that this is some kind of a one-way transaction, which is not at all the case. The 'thing known', while in the process of giving up some essence to the 'knower', is *simultaneously experiencing and comprehending the 'knower'*. When one being confronts another, *both are at once 'knower' and 'thing known'*. If I pick up a rock and contemplate it, feel its weight, its texture, see its color, I am incorporating some essences of that rock into my being, becoming changed by them, and thereby knowing the rock. At the same time, the rock is sensing me, receiving the heat of my body, feeling the force of my hand -- these influences change the rock, in however slight a manner, and thereby it comes to 'know' me. I become, in some small way, 'like the rock', and likewise the rock becomes, in some small way, 'like me'. We are both, simultaneously, knower and known. We change each other, together. *We participate in one another's existence.*

In such a picture, knowledge becomes reciprocal. It is all based on the concept of *exchange*. Each thing gives something of itself to the other, and through this process we come to know one another. Thus, participatory knowledge is based on *exchange*, and on *mutual transformation*. We co-create and co-define each other.

We move through the world by a series of interactions. Various things come in and out of our field of sensitivities. As things come into our perceptive field, we interact with them, and they interact with us. This interaction takes the form of exchange, as it must. Writing in the late 1800's, Georg Simmel noted this very fact, and stated it most concisely: "Every interaction has to be regarded as an exchange" (1900/1978: 82). It is this exchange, and the subsequent transformations, that are the basis of participatory knowledge.

But what exactly is exchanged? For Campanella it was his 'essences', but he was unable to more clearly define what these were. He could not quantify precisely what it is that gets exchanged. From the perspective of a material world, however, the answer is simple: mass or energy, in various forms. Different forms of energy have different effects on the 'knower', depending on its sensitivity to that particular form of energy. The sensitivity is determined by the path or channel through which the energy is incorporated into the knower. A shot of cognac may taste rich and sublime, and through this interaction I come to know some aspect of it. A splash on my hand may feel cool and clean, and this way I learn about some other aspect. Or, the same splash in my eye may sting badly, and bring about an altogether different type of knowledge. In all cases I assimilate the alcohol, but because the path of assimilation is different I learn different aspects of it.

By way of comparison, let me note here that in hylonoism I take Campanella's theory of participatory knowledge and extend it significantly. I claim that not merely knowledge but *mind itself* arises from interaction and exchange. The exchange of electrical energy in the brain results in the 'brain-mind', as one (dominant) aspect of the total mind of the body. But this phenomenon is general. *Every interaction is an exchange, and every exchange results in mind.* This is participatory panpsychism.

Campanella has been revered throughout history as a man of powerful intellect and insight. In his own time he was acknowledged for his depth of thought; Battaglino called him "one of the rarest geniuses of Italy", and Brancadoro exclaimed that "in him all fiery and most subtle powers are glowing and excel in the utmost degree."[16]. Leibniz ranked him with Bacon, Hobbes, and Descartes[17]. He remains, along with Bruno, as the outstanding exemplars of Renaissance naturalism, and they mark the turning point from a medieval, theological worldview to a modern, scientific worldview.

NOTES:

[1] There are some panpsychist position which hold that not literally every object, but rather *most* objects, or the *most fundamental* objects (such as atoms), possess mind. The panexperientialism of Hartshorne and Griffin is the primary case in point. This will be examined in more detail in Chapter 6.

[2] Additionally, there were at least another 80 or so lesser figures, including Xenophanes, Alcmaeon, Hippasus, Melissus, Archelaus, and a host of utterly obscure individuals. I will not be addressing their ideas here.

[3] Democritus was actually younger than Socrates, but he is typically grouped with the other pre-Socratics because of his close connection to Leucippus. I will follow tradition and refer to the 'Democritean theory of atomism', even though it is likely that Leucippus originated some of the concepts.

[4] Heraclitus does use a variant of *zoe* as an adjective describing his *arche* of fire. More on this in the text that follows.

[5] There is a potential epistemological and ontological problem here: can the pure elements 'know' each other? It would appear not, since pure fire and pure air, for example, have nothing in common. Logically it would seem that they must remain forever unknowable to each other. Further, if the elements cannot know each other, it would seem that they cannot directly interact at all. And yet, they somehow combine to form all composite things of the everyday world. Evidently the powers of Love and Strife bridge this 'gap of unknowability', and allow elements to combine. Apparently this was not seen as a major concern.

[6] It has been estimated that 90% of all world religions are or have been monotheistic.

[7] Iamblichus' development of his ideas on participation occur in Book I of his main work, On the Mysteries (ca. 290/1989). See especially chapters 7-10 and 18.

[8] See for example the passages 628, 743, 1041, 1069, 1070. Also helpful is the introductory discussion of this work by Morrow and Dillon (in Proclus, 1987: xix-xxiv). A good general discussion of participation in Proclus can be found in Lloyd (1967: 305-313).

[9] O'Rourke observes: "His [Dionysius'] importance for Aquinas...should not be underestimated; the phrases and themes of Dionysius appear almost at every turn and in the most unexpected contexts." (1992: 276).

[10] The most recent account is Wippel (2000), especially Chapter 4, "Participation and the Problem of the One and the Many" – though this material is primarily a minor updating of Wippel's (1987). Other writings on the topic include Henle (1956), Clarke (1994), and Te Velde (1995). The earliest works focusing on Aquinas' theory of participation are Fabro (1939) and Geiger (1942), though neither book has been translated into English.

[11] His hierarchy consisted of: God, angelic mind, rational soul, 'quality', and 'body'. Soul, being in the third position, was at the 'center' of the cosmic hierarchy.

[12] This is virtually identical to Koestler's definition of the "holon" – see his 1967. Unfortunately Koestler nowhere cites these ideas of Cardano, which indicates a somewhat surprising lack of knowledge on his part.

[13] Patrizi's actual term was 'pampsychia'. I have found no explanation why he would have used an 'm' in his spelling.

[14] These levels are: unity, essence, life, intelligence, *soul*, nature, quality, form, and body.

[15] See for example Calcagno (1998: 195).

[16] Both quotations cited in Bonansea (1969: 35).

[17] Cf. Bonansea (1969: 36).

Chapter 6 – The Modern Era of Panpsychism and Participation

1) Emergence of the Mechanistic Worldview in the 17th Century – Spinoza and Leibniz

In the 1600's one finds an emerging scientific and objectivist worldview competing with the naturalistic and animistic theories of the Renaissance. The early rationalism and empiricism led the departure from Scholasticism and Church orthodoxy. Science was now poised to make great advances. But panpsychism and participatory thinking would survive, albeit in increasingly diverse forms.

With respect to philosophy of mind, the 17th century is dominated by perhaps the two most notable panpsychist philosophers, Benedictus Spinoza (1632-1677) and Gottfried Leibniz (1646-1716). Both created comprehensive metaphysical systems that attempted to bring order to mind and reality. Both were strongly panpsychist, and both made a number of observations that were remarkably anticipatory of hylonoism, and participatory philosophy generally. So much has been written about their views that I will only provide the briefest of summaries here. Instead I will focus on the connection to the central ideas of my thesis.

Spinoza's ideas are presented primarily in his magnum opus, the Ethics (1677). His approach in the Ethics was 'geometrical', that is, it relied on a system of arguments patterned after mathematical formalism. Such a mathematical methodology was a very recent development in philosophy, largely attributable to Descartes. But beyond pure methodology, Spinoza believed that mathematics could lead to true insight into the nature of reality. Allison notes that, for Spinoza, "the principles that apply to mathematical objects and perhaps other abstract entities *also apply to reality as such.* Thus, [he achieves] a real definition, an adequate, true or clear and distinct idea of a thing..." (1998: 92; my italics). This is essentially my claim about hylonoism: that even though it is a mathematical formalism, it nonetheless makes very real and clear statements about reality.

Spinoza created a radical monism in which the single underlying substance of all reality was what he called 'God'. This substance he saw as identical with the natural cosmos, and thus he equated God with Nature – resulting in a strong form of pantheism. Recognizing mental and physical phenomenon as a part of reality, Spinoza declared these to be two of infinitely many 'attributes' of the one God/Nature; these two realms are referred to as "*thought*" and "*extension*", respectively. Thus Spinoza's theory is often called a 'dual-aspect' theory of mind and matter. Particular objects, or particular thoughts and mental states, are called 'modes' of the corresponding attribute. For example, a table is a 'mode of *extension*', and pain is a 'mode of *thought*'.

The two realms, extension and thought, are not independent. Quite the opposite. They have a very specific and fundamental connection: every physical "thing" (Spinoza's term) has a corresponding mental aspect, which Spinoza calls an "idea", and conversely every mental idea has a corresponding object, or thing. This is Spinoza's unique brand of unity, known as *psycho-physical parallelism.* To every physical thing or event there corresponds an *idea* of that thing or event. As physical things change and evolve with time, so too in an exactly corresponding manner do the ideas. In his words, "the order and connection of ideas is the same as the order and connection of things." (IIP7)[1]. They are "the same" because they both reflect the single underlying unity of God/Nature.

Moreover, the 'idea of an object' is to have a very specific interpretation: it is the *'mind'* of that object. Every mode of extension has its corresponding mind, which is its mode of thought. Since every object has a corresponding idea, *every object can be said to have a mind.* This is most clear to us in our own case, wherein the human mind is simply the idea of the human body. But it is a general ontological principle, and thus applies to all things.

This is spelled out explicitly in the Scholium of Part II, Prop. 13. He states:

> From these [propositions] we understand not only *that* the human mind is united to the body, but also *what should be understood* by the union of mind

> and body. ... For the things we have shown so far are *completely general* and *do not pertain more to man than to other individuals, all of which, though in different degrees, are nevertheless animate.* (my italics)

Spinoza then goes on to explain what he means by "different degrees":

> I say this in general, that in proportion as a body is more capable than others of doing many things at once, or being acted on in many ways at once, so its mind is more capable than others of perceiving many things at once. (ibid)

In other words, *the greater the complexity of interaction with the world that a given object has, the greater the complexity of the corresponding mind.* Clearly, physical objects exist and interact in varying degrees of complexity, and this fact accounts for the variation in complexity of their minds, of one being "more excellent" than another. This is an important insight, and it strongly anticipates not only Teilhard's thesis of complexity/consciousness, but my own theory of hylonoism.

Recall my earlier discussion: I claim that reality consists of two realms, that of participatory matter (the Partimater), and that of participatory mind (the Partimens). Hylonoism states that every physical object or system has a corresponding mind, given by a singular hylon point, which moves in the mental realm, the Partimens. The hylon corresponds with the physical object, but is not 'caused' by it; there is simply a one-to-one association between the two. As the physical system changes in space-time, so the hylon moves in 'nous-time'. And the complexity of the physical system -- such as the number of neurons in the brain, speed of energy exchange, degree of interconnection -- determines the complexity of the corresponding hylon-space, as measured by the number of dimensions of the phase space and the complexity of the virtual attractor pattern (i.e. personality). A richer, more complex physical object will correspond with a richer, more complex, 'more excellent' (to use Spinoza's phrase) personality, or mind.

As I see it, there is strong affinity between Spinoza's ideas and my own. Spinoza devised the basic ontological structure, but I think that hylonoism represents an important new stage of thinking because it explains not simply *that* such a correspondence occurs, but *how*. And hylonoism carries with it many further implications and articulations that Spinoza's theory simply could not anticipate.

Of course, neither theory really explains *why* this should be the case -- why is it that dynamical physical systems can be captured by a single point moving in a multi-dimensional space? Stated otherwise: Why are there minds at all? Such a brute fact of ontology may never have an adequate 'explanation', other than through some recourse to ultimate cosmological principles like the Anthropic Principle, or Teilhard's Omega Point. Perhaps one can only state that the presence of mind is in the transcendent nature of the cosmos, that a cosmos without mind is literally and figuratively unthinkable.

Is Spinoza a 'participatory' philosopher? I think he is, but in a subtle, groping way. Spinoza is clearly holistic. He identifies Nature with God, and thus adopts a reverential attitude to all beings. He finds a home for the 'spiritual' in his attribute of mind, and places this on equal footing with the material aspect of reality. On the other hand, he is notoriously deterministic, and perhaps overly rational in demeanor; his vision suggests the mechanistic perspective to come. And he has no conception of an evolving, open-ended cosmos -- an idea that would not emerge until the time of Diderot, some 50 years later. Still, his accomplishments will always rank among the greatest in Western philosophy.

Leibniz was a comprehensive thinker, making important advances in philosophy, mathematics and physics. Here I can focus only on one aspect of his philosophical system, namely, his conception of the *monad*. This is expressed chiefly in his work <u>The Monadology</u> (1714b), but it appears throughout his philosophical corpus. The concept of the monad is important for two reasons: one, because it is the basis for his panpsychism, and two, it has a number of clear comparisons to my concept of the hylon.

A monad is an atom-like, small and simple substance that is the basis of all reality. All material objects are simply aggregates or composites of a large number of these point-like substances. Monads are 'simple' but yet possess a number of important and interesting characteristics. Five of these are relevant to our discussion.

One, Leibniz writes, somewhat cryptically, that monads are "windowless". Some commentators take this to mean that they are causally exempt from the rest of the physical world, but this is inconsistent with other statements he makes (see below). Rather, I interpret this more literally: that the monad is something into which we 'cannot see'. The monad is an irreducible entity of which we cannot analyze as we do other natural phenomena. If we 'peer into' a monad in a scientific sense, nothing presents itself to us. We must understand it on the basis of first principles.

However, this is not to say that the monad cannot accept outside influences into itself. The second point is that in spite of being windowless, every monad is utterly unique in that each represents a unique perspective or outlook on the universe. This uniqueness of outlook results in a "plurality of properties and relations" (1714b, sec. 13) within the monad. As Leibniz explains: "Each monad is a living mirror...which represents the universe from its own point of view, and is as ordered as the universe itself." (1714a, sec. 3).

Three: The internal ordering of the monads is to be understood as consisting of two primary qualities, *perception* and *appetite*. The changing internal states are the *perceptions of the monads*, and these changes are brought about (in a rather vague way) by the monad's appetite.

Four: There is of course a strongly animistic implication in these two terms, and for good reason: *each monad is identified with a 'soul'*. The connection of 'soul' with a point-like entity comes from the earliest parts of Leibniz's philosophy. Even in 1671, at age 25, he noted that "the soul, strictly speaking, is only at a point in space..." (cited in Hoeffding, 1908: 335). This reiteration of Bruno's equation of the monad with the atom is another intriguing anticipation of the hylon, and the idea of mind as 'a point in space'. Later, in 1695, he writes of "true unities" underlying reality:

> [I]n order to find these *real unities*, I was forced to have recourse to a *real and animated point*, so to speak, or to an atom of substance which must include something of form or activity to make a complete being. (1695: 139)

Here again we see the association of 'animation' with a point-like entity. Leibniz continues:

> I found that [the monad's] nature consists in force, and that from this there follows something analogous to sensation [i.e. perception] and appetite, so that we must conceive of them on the model of the notion we have of *souls*. (ibid.)
>
> We could call them *metaphysical points*: they have *something vital*, a kind of *perception*, and [furthermore] *mathematical points* are the *points of view* from which they express the universe. (ibid, p. 142; original italics)

This is a very clear description of what, for Leibniz, could only have been a strong intuition of the nature of soul. Being a mathematician, it would certainly be natural for him to express the point-like nature of the soul in mathematical terms.

The fifth characteristic of the monad is the fact that it is, above all, a *unity*. Monads themselves are unities, but so too are collections of monads. Any material object is a 'collection of monads', and is integrated by the action of a "dominant monad" which represents the integrated unity of the object. The dominant monad is the soul/mind of the object, and recalls the Stoic concept of the *hegemonikon*. The mind of human being is associated with the dominant monad of the body.

One is led to ponder how and why Leibniz would have articulated such a theory of mind and being. It seems not to follow necessarily from any of his other work, and in fact he really offers little in the way of a philosophical defense for his monadology. Certainly he was influenced by Bruno and Campanella[2], but this does not explain his reasons for holding such a theory. It seems to me that Leibniz simply had a deep intuitive feeling that mind was of a point-like nature, was non-physical in some sense, and must be seen, in a consistent universe, to inhere in all things. This is precisely the view of hylonoism. In the 21st century, I have the advantage of expressing such intuitions in more precise language, and thus (hopefully) can provide more in the way of a philosophical defense.

Together, Spinoza and Leibniz anticipate many central intuitions of hylonoism. It would not be too far from the mark to describe hylonoism as a highly-articulated "Spinozist monadology".

To close out this discussion of the 1600's, I note two comments by Issac **Newton** (1642-1727). As the Father of the Newtonian worldview, he is typically depicted as a hard-core materialist who sought explanation of all phenomena in the movement of inert atoms by various mechanistic forces.

In fact, Newton had serious doubts about viewing matter as dead and inert, and some believe that he actually had a strong inclination to view all matter as *living (hylozoism)*, and even as possessing mind-like qualities. Robert McRae (1981) performed a brief but interesting study along this line, based largely on a detailed investigation by McGuire (1968) of Newton's post-*Principia* writings. McRae states very directly, "Newton had no objection to hylozoism... [and] indeed, appears to have been powerfully attracted to [it]." (p. 191).

The basis for this can be found in a draft variant of Query 22 in the 1706 work *Optice*.

> For Bodies...are passive. ... [T]hey cannot move themselves; and without some other principle than the *vis inertiae* ['inertial force'] there could be no motion in the world. ... And if there be another Principle of motion there must be other laws of motion depending on that Principle. ... We find in ourselves a power of moving our bodies by our thoughts...and see [the] same power in other living creatures but how this is done and by what laws we do not know. ... [I]t appears that there are other laws of motion...[and

> this is] enough to justify and encourage our search after them. *We cannot say that all nature is not alive.* (cited in McGuire, pp. 170-1; my italics)

Quite a statement by the Father of Mechanism! Certainly this is not an outright endorsement of hylozoism or panpsychism, but it obviously shows that he is willing to entertain the idea and not rule it out *a priori*.

Newton was influenced by the Stoics, and like them he saw a cosmos of both passive and active principles. The 'inertial force' (*vis inertiae*) was just such an active force. This was a universal force that Newton speculated might be connected to mind and will. He wrote:

> [I]f there be an universal life, and all space be the sensorium of a immaterial living, thinking, being, ...[then] the laws of motion arising from life or will may be of universal extent. (ibid, p. 205)

All of this sheds some interesting light on the emergence of the Mechanistic Worldview. The very founder of this worldview saw at least some reason to believe that the cosmos was animate throughout. Panpsychism was seen as compatible with science, and in fact served as a kind of deeper explanation of natural phenomena. Mind was inherent in matter, and its nature was not unlike that of our own human mind. This again is a form of participation, of situating the human within the universal context.

Even though the early mechanistic universe still allowed for the ubiquitous presence of mind, the stage had been set to remove it completely. Philosophers were beginning to speak of nature as a *machine*. This comes out clearly in the writings of Leibniz. Already in his first public philosophical work, "A New System of Nature" (1695), he speaks of "natural machines", but takes care to note the "true and immense distance" between machines made by God and those of man. He makes several other such references in later works, and gives the concept notable discussion in the Monadology: any body composed of monads forms "a kind of automaton or natural machine" (sec. 3). In other words, "each organized body of a living being is a kind of divine machine or natural automaton" in which its parts are themselves machines: "natural machines...are still machines in their least parts, to infinity." (sec. 64). The monads themselves are not machines, but rather the spiritual, percipient basis of all machines.

For Leibniz, his conception of material bodies as "divine machines" was a way of explaining that (a) God did not need to intervene in daily affairs on a continuous basis, and (b) the animating power of mind in the world was sufficient, together with the laws of nature, to 'automatically' explain movements and behavior. This view was compatible with that of Descartes, who radically separated mind from (human) body, and removed it completely from the physical world. This next logical step was taken by LaMettrie.

2) Continental Thinking of the 18th Century

Julien **LaMettrie** (1709-51) extended the ideas of Descartes and Leibniz, and envisioned humanity utterly devoid of soul. He had no use for God or the supernatural, and insisted that everything in the world admits of a 'natural' explanation. It was obvious that many things, including people, were capable of self-movement, and that people had certain mental abilities as well. These must therefore be explained as inherent abilities of 'ordinary matter', since by his reasoning there could be no other explanation.

The most appropriate metaphor at the time was that of a *machine*. By the early 1700's, machines were becoming quite complex and could do a variety of semi-intelligent and autonomous activities. Machines clearly operated by some internal means without any aid of the supernatural, so it was logical to assume that all things, humans included, operated in an analogous manner. This was the reasoning behind LaMettrie's infamous work, *L'Homme Machine* (Man, a Machine), which he published anonymously in 1747. Mankind itself was now being drawn into the Mechanistic Worldview that had, until then, been used only to describe the non-human world.

To explain movement and thought, LaMettrie sought a theory in which such powers were *inherent in matter.* To assume otherwise would be to attribute some special status to mankind, which sounded very much like the theological supernaturalism that LaMettrie wanted to avoid. He ultimately spelled out a view that may be called *'vitalistic materialism'*, wherein all matter contained within itself an animating force that was expressed to varying degrees, depending on the complexity and structure of the object.

LaMettrie developed these ideas both in *L'Homme Machine* and in an earlier work, The Natural History of the Soul (1745). In the earlier work he wrote of 'feeling' as a third general attribute of matter; he also stated that "it is clear enough that matter contains the motive force which animates it and which is the immediate cause of all the laws of movement." (1745: 49). He adopts a kind of agnosticism about this view, admitting that he has no comprehensive theory that would explain this. Then in *L'Homme Machine* he extends the idea that the organizational complexity of the human body accounts for its 'soul':

> [T]hese faculties are obviously just this organized brain itself, there is a well-enlightened machine! ... [Even our conscience is] no more foreign to matter than thought is... Is organization therefore sufficient for everything? Yes, once again. (1747: 59)

He continues by stating that it is the *matter of the body itself* which exhibits 'feeling': "Since thought obviously develops with the organs, why would the matter of which they are made not be susceptible to [for example] remorse once it has acquired in time the faculty of feeling?" (ibid).

Thus in LaMettrie one finds an interesting conjunction of the Mechanistic Worldview and a 'panpsychist' (or better, pansensist and pan-noetic) outlook. The two views were, to him, entirely compatible; in this sense he was very much in line with the thinking of Leibniz and Newton.

LaMettrie's dynamic theory of matter draws upon Leibniz, and anticipates the 'dynamism' school of thought that would emerge in the 1800's – recall my discussion in Chapter 3. And it lays the groundwork for the thinking of Diderot and Maupertuis that followed close behind. Finally, let me note that LaMettrie saw important ethical implications in his theory, ones that were the complete opposite of what might commonly be supposed. Rather than becoming depressed or degraded by being called a 'machine', LaMettrie suggests that people see this first of all as an integration of humanity into the larger scheme of nature, and second, as simply *the truth* – a truth that, by tearing away false illusions about ourselves, leads to greater happiness:

> Whoever thinks in this way will be wise, just, and tranquil about his fate, and consequently happy. He will await death neither fearing nor desiring it; he will cherish life...; he will be full of respect, gratitude, affection, and tenderness for nature in proportion to the love and benefits he has received from her; and, finally, happy to know nature and to witness the charming spectacle of the universe, he will certainly never suppress nature in himself or in others. (1747: 75)

LaMettrie seems to sense that there is a risk in seeing the 'man-machine' as something alien to nature, and he clearly wants to dispel this thought. In fact he, like Bruno, seems to be groping toward an articulation of an early ecological philosophy that is holistic and integrative. This trend would accelerate with the German Romanticism and *Naturphilosophie* that emerged in Goethe, Schelling, and Fechner. It would also be taken up by fellow Frenchman Denis Diderot.

As co-editor of the rationalist, humanist, and secularist work, the *Encyclopedie*, **Diderot** made clear his intentions to find naturalistic solutions to matters of philosophy and nature. Diderot's thinking was in fact quite close to that of LaMettrie, although he rejected the use of the word 'machine' in reference to living creatures. Apart from this largely semantic difference, they both sought a holistic worldview which opposed the growing presumptions about 'dead matter', and they both sought to deeply integrate humanity into the larger cosmos.

Diderot created not so much a comprehensive philosophical system, but rather was content to explore various philosophical themes. Three such themes are relevant to my discussion here, and these are: panpsychism, unity of the self, and evolution.

Like LaMettrie, Diderot's panpsychism is more appropriately described as a pansensist outlook. In his first philosophical writings Diderot displays his tendencies to such a view, including for example a sympathetic discussion of the panpsychist ideas of Maupertuis in his 1754 work, Thoughts on the Interpretation of Nature. Fifteen years later this theme strongly reemerges in Diderot's philosophical masterpiece, the dialogue *L'Reve D'Alembert* (D'Alembert's Dream, 1769). He writes that "this faculty of sensation…is a general and essential quality of matter" (p. 49). There are repeated references to the 'general sensitivity of matter'. At one point he comments that "[f]rom the elephant to the flea, from the flea to the sensitive living atom, the origin of all, there is no point in nature but suffers and enjoys." (p. 80). Even in one of his last works, Elements of Physiology (1774-80) one finds Diderot stating that "sensitiveness" is one of the five or six essential properties of all matter.

The second theme, *unity of the self*, addresses one of the fundamental problems of panpsychism: if each atom is individually intelligent, how do they combine to form the single sense of being that we all feel? Modern panpsychists refer to this as the "combination problem", and consider it one of the more significant barriers to any viable theory of panpsychism. Leibniz solved it by creating the "dominant monad". In D'Alembert's Dream, Diderot rather points toward an amorphous notion of 'unity of being' that occurs when the intelligent particles are sufficiently interactive. He makes an analogy in a swarm of bees: "This cluster is a being, an individual, an animal of sorts." (p. 67). It is a unitary being because of the extremely tight interaction between parts, which pass from being merely "contiguous" into being truly "continuous". Clearly the strength of interaction determines the intensity of the single being; and this, I may add, is precisely the conclusion of hylonoism -- intensity of exchange determines intensity of mind. To Diderot, the human body is similar to the swarm of bees; the body is a collection of organs, which "are just separate animals held together by the law of continuity in a general sympathy, unity, and identity." (p. 68). It is the "continual action and reaction" between parts that creates the unity. It is simply this *connection*, this *exchange*, that accounts for the unity: "It seems to me that contact, in itself, is enough". (p. 76).

The third theme is that of *evolution*. Diderot was one of the first to articulate the basic concept, though he was helped along by other contemporaries, among them LaMettrie and Maupertuis. LaMettrie's *Systeme d'Epicure* (1750) and Maupertuis' *Systeme de la nature* (1751) both put forth early ideas relating to the transformation of organic beings over time. Diderot's Interpretation of Nature followed shortly, in 1754, and included this passage:

> [I]t would be easy to believe that in the beginning there was only one animal, a prototype of all animals, certain of whose organs nature has merely lengthened, shortened, changed, multiplied, [and] obliterated... Imagine the fingers of your hand joined together and the material of which the nails are made becoming suddenly abundant [and] covering the whole extremity... [I]nstead of a hand you have a horse's hoof. (sec. XII)

He duly credits Maupertuis as accepting (though not inventing) this "philosophical conjecture". Then there is the famous final entry of the Interpretation, titled "Questions":

> Just as in the vegetable and animal kingdoms an individual begins, ...grows, continues to exist, degenerates, and is no more, so it might well be with species in their entirety. [Organic life may have] passed through an infinite number of structural changes and developments; [and] acquired, successively, motion, sensation, ideas, thought, reflection, conscience, feelings, passions... [M]illions of years elapsed between each of these developments; [and life] may have further developments still to undergo. (sec. LVIII)

As before, this theme is explored in D'Alembert's Dream.

> The tiny worm, wriggling in the mud, may be in the process of developing into a large animal... (pp. 53-4).
>
> Who knows what races of animals have preceded us? Who knows what races of animals will come after ours? (p. 72)
>
> [A]n organism...advances towards perfection by an infinite number of successive developments... (p. 88)

Crocker (1954) argues that "Diderot's theory [of evolution] is distinctively broader and more modern" than that of LaMettrie or Maupertuis (p. 138). And it cleared the intellectual ground for Darwin's Origin of Species (1859), which would not be published until more than a century after these three Frenchmen first articulated their ideas.

Apart from these main themes, Diderot made a number of other comments and observations that are relevant to this thesis. He recognized the importance of *exuberance* and *abundance* in the process of creativity: "Restraint destroys the greatness and energy of nature." (1746, sec. III). He acknowledged the key role that *memory* plays in identity and being: "The consciousness of continued identity...constitutes the existence of a perceiving being. ... And on what is this consciousness based? On the memory of its actions." (1769: 55). And, taking a cue from LaMettrie, Diderot expands on the concept that the complexity of the organism co-defines how it interacts with the environment; significantly, Diderot makes this concept bi-directional: "The more senses [an organism has], the more needs. ... [O]rgans produce needs, and reciprocally, needs produce organs." (ibid., p. 78). Given that needs are related to the conditions of the environment, and that organs are related to the sensitivities of the organism, we can see in this an element of *co-evolutionary participation*:

> changing environment -> new needs -> emergence of new organs -> new sensitivities;

> and conversely, new sensitivities -> development of new organs -> new needs and demands on the environment -> modification of the environment.

The organism and the environment react to each other, and in a sense mold each other in a co-evolutionary process.

Finally, following the lead of Leibniz and his monadology, Diderot makes a few isolated comments regarding the *point-like nature of the mind.* Early in Part II of D'Alembert's Dream, a sleeping D'Alembert murmurs something about "a living point... First nothing, then a living point." (p. 65); one immediately recalls the monad of Leibniz. Later in the dialogue, Mlle. de l'Espinasse reflects on the nature of her mind and its connection with all parts of the cosmos. She is asked, "What limits your real extension, the true sphere of your faculty of sensation?" "Nothing does. I exist as it were *within a single point*; I almost cease to be material, I feel nothing but my thought..." (pp. 92-3; my italics). Here is not merely some abstract monad, but the human mind itself seen as a 'single point', virtually 'immaterial'. Again there is an obvious connection to hylonoism and the hylon as an immaterial point-like mind. Diderot clearly had an intuition that his own mind had an essential point-like unity to it, and this was somehow related to the infinite extension of the sensitivities of the body. Even Kant had a similar intuition; he said that the human soul "resides in a place of a smallness impossible to describe." Let me emphasize: *this is rare insight into reality, based upon pure intuition.* Nothing in empiricist or rationalist philosophy would have led Diderot (or Leibniz, or Kant) to this conclusion. The seed may have been planted by Bruno and Plato, but there is no other way to justify such a statement. No argument is made. It is pure insight into the nature of mind.

Conflicts between panpsychism and the emerging Mechanistic Worldview occurred not only in France, of course, but throughout Europe. Kant had some interesting comments on hylozoism, and one in particular illuminates this conflict. In an early work *Traume der Geisterseher* (Dreams of a Spirit-Seer, 1766), Kant examines the spiritual realm and explores the possibilities of trans-physical phenomena. Here he shows some sympathy to a Leibnizian hylozoism/panpsychism, and suggests that such an issue may be undecidable: "[T]o which members of nature life is extended, and...those [to which] degrees of it...are next to utter lifelessness, can, perhaps, never be made out with certainty" (p. 57). Then in the next sentence he makes a prophetic statement:

> Hylozoism imputes life to everything; materialism, carefully considered, *kills everything*. (ibid; my italics)

Kant seems to sense that there are two conflicting worldviews here, one which is sympathetic and life-enhancing, and another which is clinical, dispassionate, 'anti-life'. If materialism "kills everything", it cannot be long before humanity itself is caught in this same devitalizing net.

In England, the scientist and natural philosopher Joseph Priestley was developing a dynamist theory of matter in which mind and matter are seen as two manifestations of a common underlying substance. When matter is seen as essentially 'force' rather than composed of hard, impenetrable billiard balls, then matter has become *dematerialized* – which makes it far more compatible with something ephemeral like 'mind':

> And since it has never yet been asserted, that the power of *sensation* and *thought* are incompatible with these [powers of 'attraction' and 'repulsion'], I therefore maintain, that we have no reason to suppose that there are in man two substances so distinct from each other as have been represented. (1777: 219)

Nowhere does Priestley explicitly state that all matter possesses mind, but this implication can be seen to follow from his premises. He is an implicit panpsychist, and someone who, at the time, was fundamentally challenging the 'inert matter' view of the world. Today, of course, we see this as essentially a true picture of reality; all interaction with subatomic particles is via particles of force. We have 're-materialized' force, and brought it into our standard mechanist picture of the universe.

German philosophers were developing their own theories of mind and matter, and many continued with the theme of panpsychism. Developments in science, especially biology and physics, allowed for new articulations and new perspectives. Like Priestley, Johann **Herder** (1745-1803) was a dynamist/energeticist philosopher. He argued that *'Kraft'* (force or energy) was the single underlying substance of reality, which reflected both mental and physical properties. Herder's synthesizing and holistic mind sought to unify the diversity of forces (gravity, electricity, magnetism, light) under the single framework of *Kraft*, of which the various '*Kraefte*' were different manifestations. Not only forces, but material objects as well are seen as manifestations of *Kraft*. All aspects of reality exist at different 'levels of being', each exhibiting a different level of organization of the one *Kraft*. The *Kraft* is at once a life-energy, spirit, and mind.

Herder clearly saw such a panpsychist dynamism as an alternative to the reigning Cartesian mechanistic materialism, which he strongly opposed. This opposition is consistent throughout virtually all of his philosophical writings. Nisbet notes that, for Herder, "the psychology of feeling tends to replace mechanical analysis..., and *Kraefte* increasingly supplant 'dead' matter... [From 1769 on, Herder] consistently attacks mechanistic theories of nature." (1970: 133).

Herder was a close acquaintance of Wolfgang von **Goethe** (1749-1832), and the two seemed to have shared many ideas about the nature of reality. Goethe developed a poetic form of panpsychism, which displayed itself chiefly in his writings that personified nature. Ernst Haeckel found support in Goethe's philosophy and often cited Goethe's view that mind is inseparable from matter:

> As even Goethe has clearly expressed it, "matter can never exist and act without mind, and mind never without matter." (Haeckel, 1868/1876: 487).

Haeckel's citation comes from a letter Goethe wrote near the end of his life, in 1828. The original passage is enlightening. Goethe notes that there are "two great driving forces in all nature: the concepts of *polarity* and *intensification*" (1828/1988: 6). The former is associated with the material dimension of reality, and the latter with the spiritual. He defines polarity in a very Empedoclean manner as "a state of constant attraction and repulsion"; intensification is an evolutionary imperative, a "state of ever-striving ascent" (ibid). He continues:

> Since, however, matter can never exist and act without spirit ["*Seele*", 'spirit' or 'mind'], nor spirit without matter, matter is also capable of undergoing intensification, and spirit cannot be denied its attraction and repulsion. (ibid)

Here we find a beautifully concise vision, one that applies equally well to hylonoism: '*no matter without mind, no mind without matter'*. This is *not* to say that mind is identical with matter, nor that one can be *reduced* to the other. It simply claims that mind and matter 'go together', that neither exists without the other. This is precisely the claim of hylonoism. Goethe again expresses this sentiment when he notes that Nature reflects herself "everywhere in a manner analogous to our mind." (cited in Vietor, 1950: 13). And lastly, there are suggestive passages such as the following:

> [I]t is the observer's first duty...to aim at the completeness of the phenomena...so that they will present themselves to one's observation as an organization manifesting an inner life of its own. (cited in Naydler, 1996: 83).

This "inner life" of natural phenomena bespeaks of the mind in nature.

We also find hints of participatory thinking in Goethe. Stephenson informs us that Goethe sees man as integrated and interactive with surrounding Nature, and that there is even a kind of merging of the two: "In [Goethe's] contemplation of nature-in-particular, the 'character' of the observer is caught up in the 'character' of the observed" (1995: 59). In Goethe's words, "The phenomenon is not detached from the observer; rather it is caught up in the observer's individuality." (ibid). The result is a fleeting but intense experience of identification between knower and known.

This approach to inquiry Goethe called 'delicate empiricism'. Naydler describes this in terms of participation:

> The Goethean scientist seeks to participate in the objects investigated to such a degree that the mind makes itself one with the object, thereby overcoming the sense of separateness that characterizes our normal experience of ourselves in relation to the world. (1996: 71)

Delicate empiricism thus reflects new values upon nature, values that are opposed to the traditional ones of objectivity, detachment, and control; as Naydler says, this is "essentially a reverential path, not a path of manipulation and control" (ibid: 24). Thus we find another case in which panpsychism and participation combine to point toward a new worldview.

3) 19th Century Developments in Germany and England

The struggles and conflicts of worldviews in the 1700's continued into the next century, but with a distinctly modern focus that was largely the result of advances in physics, biology, and mathematics. Many important developments occurred in Germany, beginning with the philosophy of **Schopenhauer**.

Schopenhauer's master work, The World as Will and Idea (1819), describes a two-fold system of reality. First, the world presents itself to us not as it is in itself, but rather as our minds grasp and shape it. Perception is a phenomenal image, not anything inherent in the thing that is perceived (although there may be some connection or correlation between these). The world is an 'idea' in our minds – a view essentially that of classical idealism.

Second, even though we typically do not perceive the thing-in-itself, Schopenhauer argues that this does not mean (as Kant claimed) that it is unknowable. For there is one particular object that we do know intimately, and that is our *physical human body*. We know the thing-in-itself of our own bodies because we *are* that thing. On the 'inside' we are mind, desire, feeling, emotion: in short, *will.* But the human body has no special ontological standing; it is a physical object like all objects. Therefore, whatever inner nature we have must be realized to some degree *in all things.* The thing-in-itself of all objects, then, is nothing more than will. Thus the world is both, and at once, 'idea' and 'will'. As Schopenhauer writes, "For as the world is in one aspect entirely *idea,* so in another it is entirely *will.*" (1819: 5).

If all things possess a will, then all things have an aspect of mentality – a clear panpsychist philosophy[3]. This will that is manifest in 'inanimate' objects is not 'consciousness' (which is entirely too anthropocentric a term for Schopenhauer), but rather a 'vitalizing energy' that manifests itself in terms that may be described analogously with human personality traits. The idea of 'will as force or energy' has been noted by other commentators. Hamlyn (1980) argues that Schopenhauer's will is "a kind of force which permeates nature and which thus governs all phenomena" (p. 95). Magee (1983) describes it as literally 'force' or 'energy' -- making Schopenhauer out to be a dynamist or energeticist -- and argues that the developments of 20th-century physics have "provided the most powerful confirmation that could be imagined" (p. 145) of his philosophy.

Schopenhauer lends credence to this 'energeticist' view in his own writing. On a number of occasions he equates will with the physical forces of nature. For example, he notes that "the force which attracts a stone to the ground is...in itself...will" (1819: 38). In a later work, *Ueber den Willen in der Natur* (On the Will in Nature - 1836), he states that "generally every original force manifesting itself in physical and chemical appearances, in fact gravity itself -- all these in themselves...are absolutely identical with what we find in ourselves as *will.*" (p. 20).

This life energy of nature does exhibit qualities that appear to us as 'personalities', with particular psychic or mental dispositions:

> When we scrutinize [the forces of nature] closely, we observe the tremendous, irresistible force with which rivers hurry down to the sea, the

> persistence with which the magnet turns again and again to the North Pole, the readiness with which iron flies to the magnet, the eagerness with which in electricity opposite poles strive to be reunited, and which, just like human desire, is the more intense for being thwarted: ...it will cost us no great effort of the imagination, even at so great a distance, to recognize our own nature. (ibid., p. 50)

Schopenhauer opposed the mechanistic worldview. He saw inherent limitations in a "purely mathematical" analysis of reality, and sought resolution in something approaching a *participatory* outlook. The starting point is the fact that both 'perceiver' and 'perceived' are one and the same thing -- objectifications of will. Thus, in Schopenhauer's words, "At bottom it is one entity that perceives itself and is perceived by itself... The whole process is the *self-knowledge of the will*; it starts from and returns to the will."[4]. Magee elaborates:

> [K]nowledge is at bottom a process of self-awareness, the same entity knowing itself. Subject cannot exist without object, nor object without subject. The two are correlative. (1983: 162)

And, he might have added, self-defining and co-creative. As Schopenhauer explains, "each of the two [subject and object] has meaning and existence only through and for the other, each exists with the other and vanishes with it. ... [W]here the object begins, the subject end." (1819: 5). This intimate correlation between subject and object is a consequence of the inadequacy of viewing the world solely as 'idea' -- an inadequacy that is ameliorated by seeing the world as something in itself (i.e. will):

> [T]here is...something inadequate about ['world as idea'] ...because it merely expresses the fact that the object is conditioned by the subject, without at the same time saying that the subject, as such, is also conditioned by the object. (ibid, p. 20).

Here are the first beginnings of a truly modern conception of participatory philosophy. Mind and matter co-defining each other, conditioning each other, bringing meaning and order to reality.

Finally, Schopenhauer offers insight into evolution, and to the hylonoetic concept of a layered hierarchy of minds. First, he observes that the 'higher grade' of unity of livings organisms is not reducible to the more fundamental ('lower grade') forces. He speaks of living things as exhibiting a "special Idea", a type of Platonic Form, which represents the unity of the whole organism. This holistic, anti-reductionist view is again something common among participatory thinkers.

The "special (or "higher") Idea" of the more complex organism is the result of struggle and conflicts between the lower grades of objectified will, i.e. the more fundamental forces. When such conflict occurs,

> there emerges...the phenomenon of a higher Idea which overwhelms all the less perfect phenomena which had existed previously, yet in such a way that it allows their essential nature to survive in a subordinate mode... (1819: 71)

This 'higher Idea' has something of "an entirely new character" (ibid. p. 72), that is, it is a truly emergent phenomenon. It succeeds over the lesser forces by a process of "dominating assimilation" (ibid), of pulling together and coordinating the lower objectifications of will without annihilating them – an idea that recalls both the Stoic *hegemonikon* and Leibniz's dominant monad.

This process of "striving after ever higher objectification" (ibid., p 71) is very much in line with evolutionary notions of struggle and transcendence. When such a higher Idea comes into being as a more evolved entity, it exists in conjunction with the lower subordinate Ideas, which continue on in their struggle for independence and self-realization. The higher and lower 'objectifications of will' exist simultaneously, in a kind of nested hierarchy of 'wills'.

Thus we see that every material object, as long as it persists, consists of a struggle of competing wills; the highest and dominant objectification holds sway as long as it can, but the lower grades are ever-present, always striving, waiting for the day when they can reclaim the matter of the object. Schopenhauer describes this as "a constant war against the many physical and chemical forces which, as lower Ideas, have a prior right to that matter." (ibid., p. 73). Interestingly, he makes in this context a prescient observation about the role of *energy* in sustaining an organism:

> [W]e can also say that every organism expresses the [higher] Idea it mirrors only according to the deduction of the portion of its energy expended in subduing the lower Ideas that contest its claim on matter. (ibid).

The struggle is continuous, and requires constant expenditure of energy. This is yet another anticipation of the idea of 'dissipative structures', and represents a line of thought reaching back to the 'effluences' of Empedocles.

For Schopenhauer, this "constant war" against the forces of entropy pointed to a world of endless struggle, and from this he drew notoriously pessimistic conclusions about life and existence. In opposition to this we find the philosophy of Gustav **Fechner** (1801-1887). Fechner developed an exuberant, life-enhancing vision of nature that was strongly panpsychist, and again contains elements of participation and hylonoism.

Fechner's panpsychism is focused primarily on plants. He devotes an entire book to the subject (Nanna, or on the Soul-Life of Plants, 1848). The fact that plants have a *Seele* ('soul' or 'mind'; the German translates either way) is of critical importance to him, because it serves as the basis for a completely panpsychic universe, and even a new worldview: "The decision as to whether the plants are animated or not decides many other questions and determines the whole outlook upon nature." (1848: 163).

Mind, for Fechner, exists in a hierarchy of layers, each lower layer participating in the higher. These layers run from the lowest order of being up through the universe as a whole. Thus, not only is the plant ensouled, so too are its cells. In the other direction, he sees soul in *societies* of plants and animals, in the Earth as a whole (anticipating Gaia theory), and in the solar system. Fechner is the first scientist-philosopher to seriously examine these possibilities, and to regard them as *actual features of reality*. William James was greatly impressed with Fechner's philosophical system, and gives an excellent summary of his view, which I quote at length:

> In ourselves, visual consciousness goes with our eyes, tactile consciousness with our skin. ... [T]hey come together in some sort of relation and combination in the more inclusive consciousness which each of us names his *self*. Quite similarly, says Fechner, we must suppose that my consciousness [and yours, though] they keep separate and know nothing of each other, are yet known and used together in a higher consciousness, that of the human race... Similarly, the whole human and animal kingdoms come together as conditions of a consciousness of still wider scope. This combines in the soul of the earth with the consciousness of the vegetable kingdom, which in turn contributes...to that of the whole solar system, and so on from synthesis to synthesis and height to height, till an absolutely universal consciousness is reached. (1909: 155-6)

So here is a view of mind as a nested hierarchy, reaching from the lowest forms to the greatest – a view in perfect agreement with hylonoism. Unlike the hylonoetic account, Fechner can offer only analogy, based, as with Schopenhauer, in our own personal experience. It is, as James says, "A vast analogical series, in which the basis of the analogy consists of facts directly observable in ourselves." (ibid, p. 156).

Fechner seems to have had an intimation of *chaos theory*, at least as regards the fact that small changes can have large and lasting effects. He believed that our minds are immortal, because their presence leaves a wake in the mind of the Earth, one which never dies out and is never forgotten. As James explains it: "[T]he memories and conceptual relations that have spun themselves round the perceptions of [a] person remain in the larger earth-life as distinct as ever, and form new relations and grow and develop throughout all the future..." (1909: 171)[5]. James continues his discussion of

Fechner's ideas, explaining our existence as an ephemeral structure formed upon a great sea of consciousness: "We rise upon the earth as wavelets rise upon the ocean. We grow out of her soil as leaves grow from a tree." (ibid). This beautifully anticipates Heidegger's concept of being as an 'eddy', and is again consistent with my own hylonoism. Lastly, James (perhaps more in his own voice than Fechner's) notes that *being is a two-way proposition*:

> [T]he event works back upon the background, as the wavelet works upon the waves, or as the leaf's movements work upon the sap inside the branch. The whole sea and the whole tree are registers of what has happened, and are different for the wave's and the leaf's action having occurred. (ibid, pp. 171-2).

This is a deeply insightful passage. It captures elements of chaos, of participatory ontology, and of participatory mind, all in a single grasp. In a sense, hylonoism is a new articulation of these same sentiments.

A number of other important German philosophers put forth panpsychist views, including Hermann **Lotze**, Eduard von **Hartmann**, Ernst **Haeckel**, and even (surprisingly) the positivist Ernst **Mach**, who argued that "individual sensations" (1883/1942: 580) are the basis of physical reality. These thinkers had less of an impact on participatory philosophy, so I will pass over them here.

In a similar manner, numerous panpsychist theories emerged in England and America in the mid- to late- 1800's. William Kingdom **Clifford**, Samuel **Butler**, Herbert **Spencer**, and Morton **Prince** all developed variations of panpsychism, and contributed strongly to the larger discussion of mind/matter issues.

For my purposes here, William **James** (1842-1910) is the most significant figure of this group. His <u>Principles of Psychology</u> (1890) examined a number of theories of mind, including Clifford's 'mind-stuff' theory. James is sympathetic to those who see life and mind in all things, and asserts that the theory of evolution provides among the strongest evidence yet for such a view:

> *If evolution is to work smoothly, consciousness in some shape must have been present at the very origin of things. …* Some such doctrine of *atomistic hylozoism…*is an indispensable part of a thorough-going philosophy of evolution. (1890/1950: 149).

Though agreeing with this in principle, James finds most all previous theories inadequate. He offers up an alternative, "polyzoisim" (or "multiple monadism"). He claims no originality to this view (which "has been frequently made in the history of philosophy"), but simply sees it as the most logically consistent and problem-free alternative. Consider the human brain. Under polyzoism, every cell in the brain has its own unique consciousness that is distinct and unrelated to that of the other cells. But the cells clearly interact physically, and there interaction is brought together in a unifying entity that James hypothetically calls the "central cell" or "arch-cell" -- one might say, the *ueber*-cell. Physical changes in the arch-cell represent the totality of changes in the other cells, and the consciousness associated with it is the unity consciousness of the human ego. As James explains it:

> [A]mong the cells [there is] one central or pontifical one to which our consciousness is attached. But the events of all the other cells physically influence this arch-cell; and through [it] these other cells may be said to 'combine'. ... [T]he conscious correlates to these physical modifications [in the arch-cell] form a sequence of thoughts...each of which is...an integral and uncompounded psychic thing... (p. 179)

But James quickly notes that such a theory is neither compatible with physical evidence nor entirely free of logical problems. Science, he states, has found no physical evidence for an arch-cell. Furthermore, one cannot stop logically at the cell, but must extend the reasoning down to some ultimately small and simple units -- arriving precisely at Leibniz's monadology: "The theory [of polyzoism] must set up for its elementary and irreducible psycho-physic couple, not the cell and its consciousness, but the primordial and eternal atom and its consciousness." (p. 180). Such a view seems "remote and unreal", but nonetheless "must be admitted as a possibility" -- and in fact "must have some sort of a destiny." (ibid).

James concludes the chapter by making a rather surprising conclusion: that all the arguments that tend toward an 'arch-cell' or 'dominant monad' also apply to the common conception of the *soul.* We may view the soul as a spiritual entity that unifies the physical actions of the many individual brain cells, and results in a single state of consciousness. James' purpose here is to "perhaps force some of these materialistic minds to feel the more strongly the logical respectability of the spiritualistic position." (p. 181).

Let me add here that these *very same logical arguments support hylonoism.* James' 'soul', like the hylon, represents the instantaneous state of every neuron in the brain: "The soul [read: hylon] would be thus a medium upon which...the manifold brain-processes *combine their effects.*" (ibid). Changes in the cells produce a kind a variation or movement in the soul/hylon: "To the state of the entire brain at a given moment [the soul] may respond by inward modifications of [its] own. These changes...may be simple or complex [read: 'chaotic']." (ibid). From a hylonoetic perspective, James' difficulty is rooted in that fact that the hylon is a non-physical thing that is simultaneously present with changes of energy in the brain (or body). It is a psychical entity that co-exists with (any) physical process, but yet is neither caused by, nor causal on, the physical. James admits that his soul-theory "does not strictly *explain* anything", but it has the advantage that it is "less positively objectionable than either mind-stuff or a material-monad [polyzoism] creed." (ibid: 182).

From these early sympathies, James gradually increased his commitment to panpsychism, arriving at a clear and unambiguous position by 1907. In that year he gave the Hibbert Lecture (published in 1909 as A Pluralistic Universe), not only endorsing panpsychism but challenging the basis for the mechanistic worldview. There are two kinds of philosophers, says James -- the 'cynical' and the 'sympathetic'. The former inevitably develop *materialistic* philosophies, and the latter *spiritualistic* ones. Here we see James' recognition of the ethical imperatives that are built into one's worldview. Spiritualism may be either of the dualist (traditional) type, or of the monist type. The spiritual monists, furthermore, may be either of a radically monist variety (i.e. absolute idealism), or may be more of a 'pluralist monism' (!); it is this latter group in which James places himself and his radical empiricism. The 'monism' resides in the fact that all things are 'pure experience'; the 'pluralism' in the fact that all things are 'for themselves', i.e. are objects with their own independent psychical perspectives. Radical empiricism is not only sympathetic; it is a *morally vital* philosophy. Materialism, because it removes the intimacy between mankind and nature, is cynical and axiologically defective: "Not to demand intimate relations with the universe, and not to wish them satisfactory, should be accounted signs of something wrong." (1909/1996: 33).

As I noted earlier, James devotes an entire lecture (chapter) to Fechner's panpsychism, and gives a very sympathetic reading. The subsequent lecture, "Compounding of Consciousness", offers his final solution to the 'combination problem'. Formerly he had argued that any 'collective experience' had to be unlike the 'constituent experiences'; they had to be "logically distinct". The result, logically speaking, was that combination was impossible. Now James realizes that this situation is "almost intolerable" because "it makes the universe discontinuous." (p. 206). Such logic forces one to conclude that the universe is a "contradiction incarnate". If logic compels one to this view, "so much the worse for logic" (p. 207). For James, logic is an intellectual tool of the cynical materialistic philosophers, and he now abandons it. Faced with the choice, he opts for the view that "life is logically irrational." (p. 208). He adds: "Reality, life, experience, concreteness, immediacy, use what word you will, exceeds our logic, overflows and surrounds it." (p. 212).

Here, too, he abandons his earlier soul-theory: "Souls have worn out both themselves and their welcome, that is the plain truth." (p. 210). Individual minds, and the hierarchy of lower- and higher-order mind, constitute the reality of the cosmos -- "the self-compounding of mind in its smaller and more accessible portions seems a certain fact." (p. 292). The conclusion is that "we finite minds may simultaneously be co-conscious with one another in a super-human intelligence." (ibid)[6].

In the final lecture, James clearly states his beliefs in favor of 'superhuman consciousness' and of "a general view of the world almost identical with Fechner's." (309-10). He sees in this a new worldview, a sea-change in philosophy, "a *great empirical movement towards a pluralistic panpsychic view of the universe*" (p. 313; my italics). This new worldview "threatens to short-circuit" the cynical worldview of the mechanistic materialists. This, of course, has been my thesis all along: that panpsychism is the deeper and more persistent worldview, and a return to it will mean a dismantling of the reigning Mechanistic Worldview.

Four important events in the development of panpsychism occurred in the year 1892: (1) an article by Paul Carus, "Panpsychism and panbiotism", in the journal Mind; (2) the publication of Royce's book Spirit of Modern Philosophy; (3) the publication of Friedrich Paulsen's book Introduction to Philosophy; and (4) Peirce's article, "Man's glassy essence", to which I referred in Chapter 2. The first three of these pertain primarily to a discussion dedicated to panpsychism, so I mention them here only in passing.

Peirce's article, in addition to its insights on chaos theory, argues for a panpsychist interpretation of mind and includes some comments relevant to participation and hylonoism as well. He begins with a look at physics and chemistry, and then moves on to a discussion of primitive life forms and the 'protoplasm' inside all living cells. Of all the properties of the protoplasm, the most important is that "protoplasm feels" (1892: 12) -- and what is more, it exhibits all essential qualities of mind. This sensitivity and sentience is deduced, Peirce tells us, by *analogy*: "[T]here is fair analogical inference that all protoplasm feels. It not only feels but exercises all the functions of mind." (ibid). The analogy is based on such properties as the sensitive reaction to the environment, ability to move, to grow, to reproduce, and so on.

And yet protoplasm is simply complex chemistry, a particular arrangement of molecules. 'Feeling' cannot be accounted for by mechanistic laws; therefore, we are forced to "admit that physical events are but degraded or undeveloped forms of psychical events." (p. 18)[7]. Peirce then lays out his own 'dual aspect' theory of mind, using the language of participation:

> [A]ll mind is directly or indirectly connected with all matter, and acts in a more or less regular way; so that *all mind* more or less *partakes of the nature of matter*. ... Viewing a thing from the outside, ...it appears as matter. Viewing it from the inside, ...it appears as consciousness. (p. 20; my italics)

Peirce the mathematician senses the dynamic and complex nature of such a general conception of mind; recall the quotation I cited back in Chapter 2, in which he states that "protoplasm is in an excessively unstable condition; and it is the characteristic of unstable equilibrium, that near that point excessively minute causes may produce startlingly large effects."

Such dynamic sensitivity necessarily results in *enhanced capability for feeling*: "nerve-protoplasm is...in the most unstable condition of any kind of matter; and consequently, there the resulting feeling is the most manifest." (ibid). Again, this sort of sensitivity is a general property of matter. "Wherever chance-spontaneity [i.e. unstable sensitivity] is found, there, in the same proportion, feeling exists." (p. 19).

Peirce then describes what he calls a "general idea", a concept that sounds very close to my conception of the 'quasi-attractor' and its role as 'personality' of any given mind (in the most general sense). A general idea exhibits a certain predictability that Peirce calls a "habit". In fact the general idea is rather the *mind of the habit*. As he puts it: "The consciousness of a habit involves a general idea." (p. 20). The general idea represents a dynamic change ("modification") of mind that is associated with the predictability or regularity of a random ("chance") physical system: "a general idea is a certain modification of consciousness which accompanies any regularity or general relation between chance actions." (ibid).

The 'mind' associated with the general idea is a *unity*, and this unity is essentially like that of a *human personality*, in some fundamental ontological sense:

> The consciousness of a general idea has a certain "unity of the ego" in it... It is, therefore, quite analogous to a person; and, indeed, a *person is only a particular kind of general idea*. ... [E]very general idea has the unified living feeling of a person. (pp. 20-1; my italics)

Peirce seems to struggle to express himself clearly; perhaps the language to describe his insights did not yet exist, nor allow for a concise articulation. The language of chaos theory allows us to describe a quasi-attractor pattern in the hylosphere, and the movement of single point (the hylon) to describe the dynamics of mind. But the similarity of meaning is striking, and indicative, I think, of a common underlying vision of mind.

4) The Evolution of Ideas into the 20th Century

Panpsychist interpretations of mind and matter continued into the early 20th century unabated. Royce released his magnum opus The World and the Individual (1899-1901) which elaborated on some of the themes in his panpsychism. Charles Strong published an important book, Why the Mind has a Body (1903), and Prince (1904) provided further elaborations of his ideas.

Two major milestones in the development of participatory philosophy occurred in the first decade of the 20th century: Ferdinand Schiller's Studies in Humanism, and Lucien Levy-Bruhl's How Natives Think. Beginning with **Schiller**: His pivotal work was published in 1907. It was at this point in time that all the key elements of participatory philosophy were coming into place, and Schiller was the first to fully sense that something of major importance was emerging. He drew together four key elements of participation: (1) 'evolutionism', (2) the idea that we not only 'create truth' but also even 'create reality', (3) panpsychism, (4) the importance of 'action' in the realm of philosophy and human affairs. This last point is of notable historic importance because it establishes Schiller as one of the founders of the field of 'action research' -- the methodology of which has been built on the basis of the Participatory Worldview.

Schiller is most well known as a humanist and pragmatist, but his particular interpretation of these views was highly original and insightful. In the early part of the 20th century there were four major pragmatist philosophers: Peirce, James, Dewey, and Schiller. Interestingly, *all four held to panpsychist views*. Yet this fact does not appear to bear directly on pragmatism, which traditionally includes the views that (a) truth is not absolute, and depends in some sense on human interaction; and (b) the critical factor in a philosophical theory is its *consequences*, its implications in the real world. Perhaps openness to panpsychism comes from the 'flexibility of thought' engendered by pragmatism -- the willingness to repudiate standard or fixed notions of truth -- along with the view of experience as an on-going process that is in some sense constitutive of both subject and object.

The personal and subjective aspects of pragmatism were taken up by Schiller, and he developed them in light of a profoundly humanist perspective. These led him to a philosophy of mind and an ontology that were deeply participatory and panpsychist; and to see that all notions of truth and reality are actually determined, for us, by our modes of inquiry and interaction, but more generally by the manner in which any being participates in the world. All of these ideas appear in his Studies in Humanism.

Early in the book Schiller explores themes of participation in Plato, especially the Parmenides. He recalls Plato's thesis that the ordinary world of phenomena, which is something less than ultimate reality, takes its meaning and integrity only through its participation in the ideal realm of the Forms; he writes that "the perishable world of Sense...is saved from utter unreality by its relation to the Ideas in which it can mysteriously 'participate'." (p. 45). Schiller notes that this is problematic, because we have a hard time understanding just how such a participation can work: "The weak point in [Plato's] theory lies in the difficulty of conceiving the connection between the Ideal world and the phenomenal, i.e. the precise nature of 'participation'." (ibid). Schiller sees Plato's difficulty as arising from his notion of absolute truth, and his conception of reality as timeless and static. Plato has a significant logical problem in describing precisely how the dynamic world of phenomena can participate with the unchanging and immortal Forms. Schiller's solution is to discard the realm of the absolute, and to adopt a dynamic, participatory theory in which truth and reality gradually take shape over time, as a function of the modes of human inquiry.

Schiller then tackles directly the twin themes of Truth and Reality. Truth, he says, is neither absolute nor eternal, but is *literally created by humans*. Consider truth as embodied in 'facts'. Facts, Schiller explains, "are far from being rigid, irresistible, triumphant forces of nature; rather they are artificial products of our selection, of our interests, of our hopes, of our fears." (p. 371). The ideal of an objective fact of nature, as lying around waiting to be 'discovered', is absurd. Rather, humans work upon the 'raw chaos' of the world; they use their various sensitivities and apply their existing structures of thinking to create a datum, a quantum of knowledge. The sciences are created as coherent systems of these data; "they, very largely, *make their own facts as they proceed.*" (p. 370). In other words, "the sciences always select and 'cook' their facts. ... Hence what is fact for one science, and from one point of view, is not so for and from another, and may be irrelevant or a fiction." (p. 371). Thus, it is the *active role of individuals* that results in the making of truth; Schiller says that "it is an active endeavor, in which our whole nature is engaged." (p. 425). In this vein Schiller devotes an entire chapter to "the making of truth".

Likewise he addresses the immediate implication: if humans can, in a sense, make truth, then we also must be said to make *reality*. And in fact Chapter 19 is titled, "The Making of Reality" -- the climactic chapter of the book. Schiller attributes to Hegel the view that "the making of truth and the making of reality must be made to coincide." (p. 422). But Hegel failed when he conceived of the thought-process as abstract and dehumanized. Schiller seeks to reattach thought to reality, and he does so in a deeply ontological manner. He explains:

> In validating our claims to 'truth' we really 'discover' realities. And we really transform them by our cognitive efforts, thereby proving our desires and ideas to be real forces in the shaping of our world. (p. 425)

> *[R]eality can, as such and wholly, be engendered by the consequences of our dealings with it.* (p. 428)

But just in what sense can it meaningfully be said that we 'make reality'? Schiller first notes that, unquestionably, what passes for truth and reality *changes over time.* Evolution applies to these concepts just as it does to the entire cosmos, and as humanity evolves and its worldviews evolve, so do truth and reality:

> Methodologically we may and must assume that every truth and every reality now recognized is to be conceived as evolved from the cognitive process in which we now observe it, and as destined to have a further history. (p. 433)

To speak of some abstract, theoretical 'reality' that is unarticulated by the human mind is to speak nonsense. Paraphrasing Skolimowski: *Unarticulated reality is no reality at all.*

So we must accept that reality changes over time, and that human actions have a fundamental role in this change. Still, are we justified in claiming that "our making of truth really alters reality"? Schiller's answer is an unwavering 'yes'. He simplifies his explanation by reducing the process of knowledge to its two essentials of 'knower' (subject) and 'known' (object). The question then becomes: by the process of 'knowing', in what ways (if any) are the subject and object modified or affected? This is the essence of the issue, as it is obvious that both knower and known are *parts of reality*, so if they are changed by 'mere knowing', then *eo ipso* reality is changed. To change reality through the process of 'knowing' is, for Schiller, the process of "making reality".

Consider first the knower. Given the above, it is self-evident that knowing changes the knower, and thus 'reality'. In particular, the subject actively *selects* certain aspects of its environment. The subject is, in general, confronted with a vast and complex flux of natural phenomena, and it must, in some sense, decide which aspects are of significance. By focusing on some portion of the environment the knower modifies both its own mental patterns and physical state. As a result, the behavior and actions of the subject will be altered. Schiller emphasizes this point: "Knowing always really alters the knower; and as the knower is real and a part of reality, *reality is really altered.*" (p. 439).

Now consider the object known. First of all, the fact that the subject's actions will be changed by the knowledge of some object makes it likely (actually, inevitable[8]), that these actions will affect the object known. My knowledge of an apple on the table is likely to affect, in some clear and obvious way, the state of the apple. All knowledge is either actually or potentially applicable to events in the real world; as Schiller points out, it is "not real knowledge, if it cannot be applied." (p. 438). This is the first and most obvious sense in which 'objective' reality is altered by knowledge. Second, a thing known is affected when it is *sensitive to the state of knowledge of the observer*. This condition occurs when the state of the object "depend[s] essentially on whether it is *aware of being known*" (p. 440). This again is obvious when considering humans, or higher animals. Schiller cites the example of an actor suffering stage fright, because he is concerned about the thoughts and feelings of the (knowing) audience. Pets clearly respond and are sensitive to the mental state of their owners.

But what about the lower animals, or plants, or 'inanimate' objects? Schiller is adamant; *all objects whatsoever* are altered by the process of being known. He takes the standard example of a stone. Here is an object that displays an "apparent absence of response", and seems utterly unconcerned whether it is being apprehended by a knower. But this apparent unresponsiveness is illusory:

> A stone, no doubt, does not apprehend us as spiritual beings... But does this amount to saying that it does not apprehend us at all, and takes no note

> whatever of our existence? Not at all; it is aware of us and affected by us on the plane on which its own existence is passed... It faithfully exercises all the physical functions, and influences us by so doing. It gravitates and resists pressure, and obstructs...vibrations, etc, and makes itself respected as such a body. And it treats us as if of a like nature with itself, on the level of its understanding... (p. 442)

The 'common world' of knowledge, the common reality between a person and a stone, is clearly not the same as that between two people. But it is certainly not lacking in 'reality'. It is a brute plane of existence, of mass, force, temperature; it is one in which the two objects, knower and known, come together with *different histories* and *different sensitivities*. The stone "plays its part and responds according to the measure of its capacity" (ibid). As Skolimowski has said: *'Reality' for each being is a function of its sensitivities.*

To the charge that this view is "sheer hylozoism", Schiller responds, "What if it is, so long as it really brings out a genuine analogy? The notion that 'matter' must be denounced as 'dead'...no longer commends itself to modern science." (p. 443). Schiller then correctly notes that his view is more accurately described as 'panpsychism' – as seeing all things with a mind after the manner of the human mind. This is why he emphasizes that his view is that of 'humanism'. And it is humanistic in a second sense: that it seeks to integrate the human into the universe. After all, the true end objective of any valid system of philosophy is "to make the human and the cosmic more akin, and to bring them closer to us, that we may act upon them more successfully." (ibid).

Thus Schiller makes his case that both the knower and the known become altered, changed, 're-made', in the process of knowing. The critic may at this point object: "But this is not what one means by 'making reality'!" To which Schiller might reply, "What were you expecting?" Of course, he does not mean that we can 'create something out of nothing', or that we have some strange powers of telekinesis. We work with the 'primal chaos' of the universe, which is meaningless and in a sense non-existent *as such*, until we act upon it and make it something known. This is a deep insight into the nature of the world, a fact that perhaps only a few have grasped in its full significance.

But Schiller was the first to make the leap of understanding, to see (A) that all things have an aspect of mentality after the manner of the human, and therefore (B) that *all things*, not just humans, *have some power to make reality.* He is very explicit on this point: humanism, as he conceives it, sees "the occurrence of something essentially analogous to the human making of reality throughout the universe." (p. 437). This is a tremendous advance in thinking, and has been utterly unappreciated by 20th century philosophers. Understandably so, because it is a complete slap in the face to the positivism and realism that have dominated philosophical inquiry. To them, this sounds like pure subjectivism, or worse; yet Schiller is quick to note that a 'common world' nonetheless emerges, because of our common history, common physiology, and common culture. This common world is an *intersubjective reality*, neither purely subjective nor absolute.

Schiller's concept of all objects as 'makers of reality' is a central anticipation of my own concept of *'noetic symmetry'*, which is really an expansion and new reading of Schiller in light of our understanding of chaos theory. I claim that *all objects always simultaneously apprehend each other*, to a greater or lesser degree; this interaction yields a *new structure of mind*, one whose intensity is determined by the degree of interaction.

Chaos theory now affords us a completely new way of understanding how things interact, combine, and affect one another – something that Schiller, like Peirce, seems to have sensed. Let me note here one relevant comment by Schiller. In leading up to his chapter on "Making Reality", he addresses the charge that human freedom is inconsequential because it can have only "infinitesimal effects" on the Earth. As he says, "it cannot divert the stars in their courses, it cannot even regulate the motions of the earth; it cannot ward off the ultimate collapse of the Solar System" (p. 412). His reply to this criticism is that (a) human freedom "is not necessarily negligible [just] because it cannot control the cosmic masses", (b) the fact that our influence appears confined to the surface of the Earth is of no small importance, (c) reality is "far more plastic than as yet we dare to think", and most importantly (d) "even *differences of choice which at first seem infinitesimal may lead to growing divergences*, and ultimately constitute all the difference between a world in which we are saved and one in which we are damned." (ibid; my italics). This is a beautiful anticipation of chaos theory, something that Schiller perhaps picked up from fellow pragmatist Peirce (recall my discussion of Peirce, 1892).

Finally, let me note Schiller's emphasis on the importance of *action*. Like all the pragmatists, he sees the value and 'proof' of philosophy in its consequences. To a greater degree than the other pragmatists, Schiller stresses the role of human action and its close connection to one's overall worldview. I noted earlier the quote by Schiller in which he emphasizes that the guiding theme of his humanism is such that "we may act upon [the human and cosmic realms] more successfully". This indicates his emphasis on *human action* as literally changing truth, and changing reality. He adds that the true process of knowing "always ends in an action which tests its truth" (p. 440). He asks that we "consider the whole process as completed, i.e. as issuing in action, and as sooner or later altering reality" (ibid). This is Schiller's "pragmatic conception of knowledge", and is a clear anticipation of the theory of 'action research' as envisioned by Kurt Lewin in the 1940's, the man who is often cited as the founder of that movement[9].

Schiller maintains this overall philosophical outlook throughout his writings. We find in one of his last works, <u>Logic for Use</u> (1929), a reiteration of the themes found in <u>Studies</u>. In discussing the meaning of humans as 'making reality', he notes: "For what is real and true for us depends on our selecting interests: the answers we get follow from the questions we put." (p. 445). He emphasizes his pragmatism and thesis of action: "Real knowledge does not lie idle – it colours our life. We act on it, and act differently. So reality is altered, not only *in* us but *through* us." (p. 446). And, he again points out that all objects whatsoever have some limited power to make reality:

> [W]e can say that inanimate objects also are responsive to each other, and modify their behavior accordingly. A stone is not indifferent to other stones. On the contrary, it is attracted by every material body in the physical world. ... [T]he stone responds, after its fashion, to our manipulation. Treat them differently, and they behave differently: that is as true of stones as of men. (p. 447)

As it happens, Schiller's philosophy was largely overlooked for many years after his death in 1937. Only with Skolimowski's work do these themes become resurrected, and very recently there has been something of a resurgent interest in Schiller's writing; reissues of both Studies and Logic for Use are planned in the coming few years.

Levy-Bruhl (1857-1939) was a French philosopher who turned his attentions to the issues surrounding the mental systems of indigenous peoples around the world. He published *Les functions mentales dans les societes inferierures* (How Natives Think) in 1910, in which he offered up a comprehensive theory of the general mode of thought in the various native cultures. This theory he called the "Law of Participation", and it was the first instance in which the concept of participation was taken as the basis for an entire worldview. Levy-Bruhl's theory of participation is closely intermingled with the concept of indigenous animism; once again, we find a case of a deep philosophical connection between participation and a panpsychist ontology.

Prior to Levy-Bruhl, the standard explanation for the 'bizarre' behavior of native societies was animism. This was seen as a nearly universal quality of indigenous people, and depicted in strict contrast to European rationalism. In using the term 'animism', the European anthropologists took a euro-centric perspective; they defined it as 'all things possess a soul', where soul was interpreted in the conventional, dualistic, theistic Christian sense. When natives spoke of animals, plants, or objects possessing a 'spirit', anthropologists interpreted this in the only sense they were familiar with. This 'philosophical animism' was then explained as the basis for the indigenous worldview.

Levy-Bruhl saw through this euro-centric bias. He extensively and carefully examined a large number of original sources on native culture, and drew different conclusions. First, he concluded that the native worldview not merely animated, it was *mystical.* He writes:

> If I were to express in one word the general peculiarity of the collective [native] representations..., I should say that this mental activity was a *mystic* one. ... [T]he reality surrounding the primitives is itself mystical. Not a single being or object...is what is appears to be to us. (1910: 38).

Second, this mystic worldview coexists with a radically different mode of perception of the natural world. As Levy-Bruhl says, "primitives perceive nothing in the same way as we do." (p. 43). Natural phenomena are not 'physical' in the Western sense, nor are they 'objective'. Native perception is eminently holistic; "[it] remains an undifferentiated whole" (p. 45). Things and events are deeply and mystically interrelated.

Third, native mentality has its own sense of 'logic' that is vastly different than in the West. He points out that a central concept of logic is the 'principle of non-contradiction' -- two distinct things can not be identical, two things cannot occupy the same space at the same time, causality is temporally and spatially limited, and so on. This principle is violated many times over in native mental representations. People are literally identified with animals, objects possess powers over health and weather, people and things have multiple 'souls', etc. Non-contradiction is the core our rationalism, and yet native societies demonstrate utter disregard for this seemingly universal principle. As such, Levy-Bruhl explains that this mode of thinking may be termed "prelogical"; it is a unique form of 'logic' that is based on different and equally valid principles. Of the term 'prelogical', he says, "It is not *antilogical*; it is not *alogical* either. By designating it 'prelogical' I merely wish to state that it does not bind itself down, as our thought does, to avoiding contradiction." (p. 78).

This combined native worldview -- mystic, holistic, spiritual, prelogical -- he calls *participation mystique*: "mystical participation". The fundamental principle guiding such a worldview is the Law of Participation. It is this law rather than 'animism' that underlies native mentality. He explains:

> Now there is one element which is never lacking in such relations [between beings and objects]. In varying forms and degrees they all involve a "participation" between persons or objects which form part of the collective representation. For this reason I shall...call the principle which...governs the connections and the preconnections of such representation, *the law of participation.* (p. 76)

Levy-Bruhl reexamines a large number of case studies and reinterprets them in light of his Law of Participation. In each case he emphasizes that what one finds is not 'naive animism', but something more complex: "Everywhere, the very expressions used by investigators suggest the idea of participation" (p. 93). People and things participate in an inherently spiritual world, and as such all things take on an element of spirituality. Things are animate not because each has a 'soul' in the Western sense, but because they participate in a common spiritual universe that manifests itself uniquely in all things.

The Law of Participation is thus the basis for the indigenous participatory worldview. Levy-Bruhl argues that this is true for essentially all non-Western cultures, but *not only* for them. At the end of How Natives Think he points out that elements of this mode of thinking exist even within the Western worldview. The participatory perspective on the human mind, he says,

> [T]hrows light...upon our own mental activity. It leads us to recognize that the [presumed] rational unity of the thinking being...is a *desideratum*, not a fact. Even among [Europeans], ideas and relations between ideas governed by the law of participation are far from having disappeared. They exist, more or less independently, more or less impaired, but yet ineradicable, side

> by side with those subject to the [conventional] laws of reasoning. ... The prelogical and the mystic are co-existent with the logical. (p. 386)

This recalls my central point, that panpsychism runs as the deep undercurrent of human thought, and has only superficially been 'eliminated' from Western civilization. For Levy-Bruhl, participation and panpsychism (in the guise of animism) are deeply linked. They are fundamental elements of the worldviews of all people and all cultures.

Unfortunately, Levy-Bruhl's work has also been largely overlooked. Like the cotemporaneous writing of Schiller, it presented uncomfortable ideas that challenged deeply held beliefs about human nature. In the latter part of the 20th century only Barfield, Koestler, and Abram have appreciated the influence of Levy-Bruhl, and each of these men have developed participatory philosophies, as I will explain later.

Two contemporaries of Levy-Bruhl and Schiller were Henri Bergson and Samuel Alexander. **Bergson**'s major philosophical works – including Creative Evolution (1907), Mind Energy (1920), and Duration and Simultaneity (1922) – all contain passages that endorse a form of panpsychism. His development of the philosophical importance of time and evolution deeply influenced both Teilhard de Chardin[10] and Skolimowski. An examination of Bergson's philosophy of evolution would take me too far from the concept of participation, so I defer that discussion.

In a 1914 article, "The basis of realism", **Alexander** articulates not only a panpsychist ontology but the beginnings of a participatory epistemology as well. The central point of this article – recalling Schopenhauer – is that our cognitive relationship with things we experience is *essentially the same as the relationship between any two objects.* Alexander first notes that "mind and things are continuous in kind" (1914/1960: 189). This continuity between knower and known is described as one of 'compresence', or co-presence. Thus he writes: "[O]ur compresence with physical things...is a situation of the same sort as the compresence of two physical things with one another." (p. 191); or more generally, "between any two existences in the world whatsoever"[11]. Each object generally is compresent with other objects at an equal or lower order in the ontological hierarchy. The location of a thing in this hierarchy determines its ability to 'know' others:

> *Mind* enjoys itself and contemplates *life* and *physical things*. The living being, the tree, enjoys itself and contemplates the air it breathes... The distinction may be carried further down...and it may be carried up [to the realm of the divine]. [T]he universe consists of distinct real existences of different order, compresent with each other and 'knowing' each other in such measure as is possible to them at their various stages of development. (p. 195; my italics).

This can be read as an early anticipation of Skolimowski's form of participatory epistemology. Knowledge is seen as a function of the receptivity, or sensitivities, of the perceiver; "in an extended sense a physical thing 'knows' other things to the extent of its receptivity." (p. 217). Alexander continues, linking this idea to panpsychism: "We may extend the sense of cognition, and calling compresence 'knowing', may ascribe 'mind' to all things alike, in various degrees." (ibid). And he concludes with an argument by analogy for panpsychism:

> [M]atter receives much more [potency] than materialism credits it with. ... [I]t is even possible that the union of body and mind which we find in the human person may turn out in the end to be typical of every form of existence from the lowest to the highest and perhaps of the universe as a whole. (ibid)

In retrospect Alexander's work here recalls Schiller's Studies in Humanism, and presents (in less detail) many of the same themes. But the extent of this influence is unclear.

By the mid-1920's, Alfred North **Whitehead** was beginning to develop his "theory of the organism", a process philosophy and panpsychic system based upon 'events', or "actual occasions". His student and colleague, Betrand **Russell**, produced a similar philosophical view, and made a number of tantalizing though ambiguous claims about panpsychism. Russell's comments belong more properly to a dedicated discussion of panpsychism, so I will not address his ideas here. Whitehead's process philosophy is the basis for current theories of 'panexperientialism' (see e.g. Griffin, 1998), and has inspired a number of participatory thinkers in the present day, Skolimowski included. An examination of the details of Whitehead's philosophy is not appropriate here, but the relevant ideas of his are captured in the writings of Hartshorne (below).

The union of process philosophy and panpsychism reached its peak in the work of Charles **Hartshorne**. An important early work of his is the 1937 book Beyond Humanism. Here he offers a critique of science and the scientific method, which, he says, treats objects in nature not as individuals but as 'crowds', 'swarms', and 'aggregates'. Mind and sentience are *not* to be found in aggregates, but only in true individuals, and thus science overlooks the possibility of panpsychism – interpreted as 'all true individuals possess minds'. This is an important point, and is central to Hartshorne's interpretation of panpsychism. Based on his reading of Whitehead, Hartshorne claims that *only things with a deep organic unity* qualify as true individuals: these include animals and individual cells. He also includes atoms and molecules, based on the new dynamic theories of atomic structure. At the higher end of the scale he includes the universe as a whole. However, he explicitly excludes a great many objects, among these are plants, bodily organs, and all 'inorganic' objects like rocks, tables, chairs, and so on. Such things may be composed of sentient cells or sentient atoms but are not *in themselves* sentient. Nor, for the same reason, does a crowd of people have an individual mentality associated with it.

Hartshorne does not offer much in the way of argumentation for this particular dichotomy. He vaguely refers to Whitehead, who seems to have spoken of aggregates as a different class of existence, but even here (as in many cases) Whitehead is not entirely clear on the matter.

Hartshorne's dichotomy between true individuals and aggregates seems entirely too arbitrary, especially when viewed from a hylonoetic perspective. If one postulates a fundamental divide in nature, then one ought to have a compelling reason for doing so. A rock is an aggregate of sentient atoms; a person is an aggregate of sentient cells – what is the difference? The difference is in the complexity of the elementary particle in each case (atom vs. cell), and in the complexity of mass-energy exchange between these two classes of particles. But they are alike in their constitution *as aggregates*. A living aggregate is clearly different than a non-living aggregate, but not in its 'aggregate-ness'. By the theory of hylonoism, this aggregate-ness establishes the existence of a hylon, and hence a mind. Clearly the dimensionality of the phase space is vastly different, as is the complexity of the quasi-attractor personality. Even on *a priori* principles, it seems clear to me that any two coherent and persistent structures of mass-energy should share certain core characteristics, and unless one is prepared to argue for eliminativism or dualism, that mental qualities must be among these.

Hartshorne also introduces in this book his vision of a *participatory epistemology* that he calls "organic sympathy". Though not explicit, he appears to take elements from both Schiller's and Campanella's philosophies, adds the Empedoclean concept that 'like knows like' (recall the passage, "For by Earth we see Earth..."), and combines them into a view that stresses the importance of the term 'participation'. He first notes that the very process of perception, and the associated awareness, are best described as a participation in which both the subject and the object share a certain quality of the perception. Consider the perception of color: "The direct object of awareness is *participated in* by awareness, [as well as] 'color's awareness' (as feeling), so that its quality belongs for the time being to two systems, the object's and the mind's." (p. 186; original italics). Such a sharing of common qualities is the basis for his theory of knowledge. It involves an essential exchange of 'essence' in which something of each party is given to the other. "Everything I know is sympathized with, participated in, by me and hence is akin to me." (p. 187). And, he even offers the first known (though vague) definition of *participatory mind*: "'mind' is that with which at least some slight degree of imaginative sympathy, participation, is possible." (pp. 191-2).

He goes on to claim that 'organic sympathy' (and the accompanying panpsychism) is capable of resolving six major philosophical problems: mind-body, subject-object, causality, the nature of time, the nature of individuality, and the problem of knowledge (cf. 1937: 194-9). Very briefly: the human mind results from a "sympathetic participation" or "sympathetic rapport" with the sentient cells of the body -- whose sentience is itself a product of the rapport with the sentient atoms. The relation of subject to object is similarly an exchange between 'enminded' participants, without which knowledge would be impossible. More generally, all causality is manifested through such a resonance between two minds. Moments in time are a "sympathetic bond" between past and future, much as Bergson and Whitehead described. The 'individual' is a result of a balance between the integrative power of sympathy and the disintegrative power of its opposite, antipathy; in the manner of Empedocles, Hartshorne notes that pure sympathy would destroy individuality (by merging all into one), and pure antipathy would not allow for any structure or knowledge at all.

Finally, Hartshorne breaches the subject of how (or if) a perceiver can have some effect upon that which is perceived. This again recalls the arguments of Schiller, wherein the process of 'making reality' occurs through changes in reality as a consequence of perception. Hartshorne notes that the new physics reveals the insight that physical 'action' or 'effect' is not as localized as previously thought, and that there is effectively a kind of 'cosmic field' of action that is set up between knower and known. The mind perceives something by action of an object upon it, by transmission of some essence. The relevant question is whether this process of sensing "acts also upon the sensed object, [and] whether this...action is appreciable or significant." (p. 207). Although "[t]here seems no evidence that it is", he cites the work of J.B.S. Haldane as indicating the belief that it is "possible that the brain is in direct contact with the external object...through some process of outflowing into the extra-bodily field." (ibid).

The assumption is that the object 'feels' something comparable or analogous to what the subject feels -- i.e. a red apple is said to 'feel red' as it reflects red light to an observer. This is Hartshorne's concept of 'influence by sympathy'. Though he does not acknowledge it, such a sympathetic epistemology has its inspiration back in the ideas of the Renaissance naturalists. I have noted the apparent influence of Campanella in particular, and we find yet one more suggestive passage near the end of the chapter on Organic Sympathy. In discussing the importance of these ideas to the mind-body problem, Hartshorne makes reference to Campanella's three primalities of love, wisdom, and knowledge:

> We can never understand the relations of power and knowledge to love unless we concentrate upon the mind-body instance of all three relations. ... The philosophy of power, the philosophy of knowledge, the philosophy of love, will each be clear only when they all coincide in relation to the supreme instance [i.e. God as the mind of the world-soul]. (pp. 208-9)

It is not clear whether he simply failed to acknowledge Campanella, or picked the idea from Leibniz, whom he does cite on occasion[12] -- recall Leibniz's mention of these same primalities in the Monadology. Regardless, we see yet again a connection and continuity between various panpsychist philosophers and concepts of participation.

These themes continue throughout his writings. In 1977 he repeats his idea of participatory epistemology, noting that when the body is in pain both the body and the cells suffer: "what is our suffering but our participation in their suffering?" (1977: 92). The same concept holds between any two objects. "[T]he psychicalist [panpsychist] view holds that physical nature is mind in [non-human form,] with which we have more or less mutual participation." (p. 93). He quotes Carlyle: "*To know is to sympathize.*" (ibid).

Hartshorne's recent death at age 103 represents the passing of one of the most significant panpsychist philosophers of the 20th century. He consistently argued for his particular philosophy of 'psychicalism' and contrasted it repeatedly with the evident weaknesses of the materialist worldview. The vitality of present-day process philosophy is largely attributable to his work, and it remains the only unified philosophical school advocating a form of panpsychism.

One other figure of the mid-20th century that merits mention is Owen **Barfield**. Anthroposophist and friend of Rudolph Steiner, Barfield wrote on a wide variety of subjects including philosophy, religion, morality, and literature. His major contribution to participatory philosophy occurred in 1957 with his book Saving the Appearances. Inspired by Levy-Bruhl and his 'law of participation', Barfield makes the first substantial attempt at articulating a comprehensive worldview based on the philosophy of participation.

He takes up where Levy-Bruhl ended -- with the suggestion that modern society, like primitive society, is founded on a form of participation. Early in the book he offers a definition: "Participation is the extra-sensory relation between man and the phenomena" (1957: 40). Participation is inherent to the very process of phenomenal perception, and thus is "as much a fact in our [modern] case as in that of primitive man" (ibid). The earlier form of participation was direct and intuitional, something that Barfield designates "original participation" (p. 41). In this sense the 'primitive man' was directly aware of his condition of participation. Modern thinking, by contrast, is dominated by abstract, theoretical 'alpha-thinking'; this results in a 'sophisticated' new form of participation that Barfield calls "final participation" (p. 137). Because of this abstract nature, most modern people are largely unaware of their participatory interactions with the world.

Over the past 2500 years original participation has gradually been driven out of Western culture and replaced with the more 'scientific' final participation. This transition began with the ancient Greeks and attained its completion around the mid-18th century -- with Goethe standing out as the last true embodiment of original participation: "It is almost as if the Gods had purposely retained this sense in Goethe as a sort of seed-corn out of which the beginnings of final participation could peep...on the world of science." (p. 139). This "progressive decline of participation" has coincided with "the evolution of consciousness" (p. 105), and is reflected in our increasingly metaphorical language and reliance on images of phenomena rather than the phenomena themselves.

Ultimately, Barfield makes very clear the central role that participation plays in our relationship with the natural world. It is in fact the central unifying concept that makes the universe comprehensible. We risk denying this process of participation at our own peril:

> The plain fact is, that all the unity and coherence of nature depends on participation of one kind of the other. If therefore man succeeds in eliminating all original participation, without substituting any other, he will have done nothing less than to eliminate all meaning and all coherence from the cosmos. (p. 144).

Barfield argues not for a return to original participation (cf. p. 45), but rather for a recognition of the importance of participation in general, and for the development of a fully modern 'final' participation that employs humanity's full capacity for imaginative and creative thinking. Such a final participation will be "exercised with the profoundest sense of responsibility, with the deepest thankfulness and piety towards the world" (p. 147). Final participation is deeply value-laden, and invokes a reverential attitude toward the cosmos. It is such themes that Berman, Abram, and especially Skolimowski develop to a high degree in the late 20th-century, as I explain in the following section.

5) Developments of the past Three Decades

Apart from Hartshorne, few philosophers in the past 30 years have spoken out in support of panpsychism, and fewer still on behalf of participatory philosophy. The most notable example of the latter is Skolimowski, as I explained briefly in Chapter 1. I have already discussed his development of participatory philosophy, but need to elaborate on his primary work, Participatory Mind (1994). Two other names of significance arise in connection with the philosophy of participation, and these are Morris Berman and David Abram. Both men have written expressly about the connection between panpsychism and participation, and see it, as I do, as the basis for a new worldview.

Before discussing these three, I briefly note some interesting comments by Arthur Koestler. Koestler wrote profusely in the 1950's, 60's, and 70's, covering a wide range of literary and philosophical subjects. In his 1964 book The Act of Creation, Koestler articulates the beginnings of what he would call a theory of "open hierarchical systems". Writing on the nature of human emotions, he notes that the common denominator of the wide range of our human emotions

> is a feeling of participation, identification, or belonging; in other words, the self is experienced as being a *part of a larger whole*... I propose to call the common element in these emotions the *participatory* or *self-transcending* tendencies. (1964: 54)

This participatory tendency is counterbalanced by a "self-assertive" tendency in which people seek to maintain their sense of individuality.

This idea is developed in his book The Ghost in the Machine (1967). Here he presents his full theory of open hierarchical systems, in which all things, not just humans, are elements in a grand ontological hierarchy. Echoing (but not acknowledging) Cardano, Koestler argues that all things are both a *whole* composed of constituent parts, and a *part* of larger wholes: in his words, a "holon" (as I mentioned in Chapter 4, this has no connection with my concept of a hylon; there are, though, certain similarities between Koestler's open hierarchical system and the hierarchical mind of hylonoism). In Ghost he elects to drop the term 'participatory' in favor of 'integrative', the latter being "more appropriate" (cf. footnote, p. 56), but the meaning is consistent[13].

As with other participatory thinkers, Koestler sees the need to address the issue of mind and the implications of panpsychism. In his cosmological hierarchy he must either explain why 'mind' suddenly appears at the level of the human (or animal, etc), or argue that it increases progressively with level of complexity. As well he needs to address the issue of mind in supra-human 'holons'. Koestler appears undecided. On the one hand, he states, "It would, of course, be grossly anthropomorphic to speak of 'self-assertive' and 'integrative' tendencies in inanimate nature..." (1967: 62). But he continues (in the manner of Empedocles!): "It is nevertheless true that in all stable dynamic systems, stability is maintained by the equilibration of opposite forces... centrifugal or separative [and] attractive or cohesive" (ibid: 62-3). This balance of forces increases in complexity with each level of 'holon', resulting in progressively greater degrees of freedom of action: "each upward shift is accompanied by the subjective experience of freedom of decision" (1967: 347). This strongly hints at panpsychism.

Koestler openly addresses panpsychism in his book Janus (1978), noting (incorrectly) that panpsychism and Cartesian dualism occupy "opposite ends of the philosophical spectrum" (p. 229). Again he appears ambiguous. He claims that his "hierarchic approach replaces the panpsychist's continuously ascending curve...by a whole series of discrete steps – a staircase instead of a slope" (p. 230). But is this any less panpsychic? Presumably every step, except perhaps the first, has some degree of mind associated with it, and in fact he admits as much: "consciousness is not an all-or-nothing affair but a *matter of degrees*" (ibid). The levels of consciousness "extend far below the human level", and he concludes that "[this] hierarchy appears to be open-ended both in the upward and downward direction" (ibid). Koestler seems to want to deny the panpsychist implications of his own theory, but cannot find a clear argument why.

Koestler cited the work of Levy-Bruhl, and may well have picked up the designation 'participatory' from him. More recently, Abram is aware of both of these thinkers, and has integrated several of their ideas in his own philosophy. I address this shortly; but returning to the chronological order:

Morris Berman published his book The Reenchantment of the World in 1981. Here he presents a highly simplified picture of Western civilization. Prior to Descartes, he argues that the dominant mode of human interaction was that of "participating consciousness", defined roughly as an animistic, holistic, magical way of thinking. Subject and object are deeply unified in a manner that he describes as "an ecstatic merger with nature" (p. 17). The culmination of this mode of thought occurred in the alchemy of the late 1500's. Beginning as far back as 2000 BCE, he states that a non-participating, non-animistic mindset began forming, which was to eventually overtake and replace the more ancient participating consciousness. With the advent of the Scientific Revolution and the Mechanistic Worldview, this "disenchantment" came to the fore; and mind was progressively removed from natural phenomena. This process, claims Berman, is at the root of many of our present environmental, social, political, and economic problems. A participatory worldview is our only possible salvation: "Some type of holistic, or participating, consciousness and a corresponding sociopolitical formation have to emerge if we are to survive as a species" (p. 23).

Reenchantment is significant because it squarely links the two concepts of participation and animism (panpsychism). Berman notes that the modern consciousness "recognizes no element of mind in the so-called inert objects that surround us. ... One of [my] goals...is to demonstrate that it is this attitude, rather than animism, which is misguided." (pp. 69-70). Borrowing both the approach and the terminology from Barfield, Berman focuses on the contrast between the more ancient 'original participation' and more modern forms. Berman defines the traditional animism of original participation as "self and not-self identified at the moment of experience" (p. 76), thereby imbuing spirit into all things that are experienced. Original participation is deeply sensual; it is more about *feeling* than thinking.

He recounts how Newton and Descartes succeeded in overthrowing the remnants of animistic and occultist thinking. They (and others) did this, he claims, out of an expediency driven more by social, political, and economic factors than pure science:

> [The] triumph over the metaphysics of participating consciousness was not a scientific but a political process; participating consciousness was rejected, not refuted. ... [S]cience may not be epistemologically superior to the occult world view, and [the] metaphysics of participation may actually be more accurate than the metaphysics of Cartesianism. (p. 135)

But science could not completely eliminate participating consciousness, because in fact it is inherent in the human condition. Rather, the scientific mindset *denies participation,* and in doing so induces a variety of social and psychological pathologies.

Berman goes on to claim that participating consciousness reemerged in the ideas of quantum mechanics: the uncertainty principle, loss of classical determinism, Wheeler-esque interactions between observer and observed, and even panpsychist attribution of mind to quantum particles (more on this in Chapter 7). Berman argues that modern physics places emphasis on the *relationship* rather than on the entities involved, and that this points toward a new world view. Such a modern interpretation of participation is described as the "inherent truth or order in the conjunction between man and nature" (p. 151).

The animistic dimension of participation finds support, Berman explains, in the work of psychologists Karl Jung and Wilhelm Reich. They argued that the 'mind is in the body', and that material objects possess an indwelling 'unconsciousness'. As in hylonoism, people comprehend with their entire physical being; the brain is merely a "thought amplifier" (p. 179) that accentuates what the body knows. Reich's work is particularly key:

> *Reich supplies that missing link* [between animism and participation]. For if the body and the unconscious are the same thing, the permeation of nature by the latter explains why participation still exists, why sensual knowledge is a part of all cognition, and why the admission of this situation is not a return to primitive animism. (p. 180)

Berman then concludes with a fairly detailed look at the ideas of Gregory Bateson, whom Berman claims offers the only groundwork for a new participatory metaphysics that can "reunite fact and value"; he says that "Bateson's work represents the recovery of the alchemical world view in a credible, scientific form" (p.196). There are in fact some strong elements of panpsychism in Bateson, and I will examine these briefly in the next chapter. Here, suffice to say that I am less optimistic than Berman about the relevance of Bateson's metaphysics.

Berman is a psychologist, not a philosopher, and so he approaches participation from a somewhat different perspective. A formal philosophical treatment occurs in 1994 with the publication of **Skolimowski**'s seminal work, Participatory Mind. The central concept is precisely that which I have been elaborating throughout this thesis: neither 'mind' nor 'reality' exists independently, but rather that they mould and shape each other in a deep manner. Skolimowski states that they must in fact be seen as joined in a single entity, "*mind/reality*" – much like the new physics conceives of 'mass/energy'. His system is thus an ontological monism, and he refers to it as "noetic monism".

Skolimowski's participatory philosophy is far-reaching. It is "first and foremost a *process philosophy*" (p. 371), where 'process' is to be understood in the widest evolutionary sense. As he sees it, participatory philosophy is not only a new philosophy of mind, but also an epistemology, an ontology, and a new system of metaphysics. As a consequence he outlines a new Participatory Methodology, and even a new interpretation of the concept of the 'true' that he calls Participatory Truth. Together these ideas form the basis of the most highly articulated Participatory Worldview to date.

Skolimowski begins with a very basic insight that often gets overlooked: human beings cannot perceive, think, or do anything a *without the filtering effect of the human mind.* Everything we sense, everything we say, is conditioned and shaped by the structure of our mind. "Everything there is, is filtered by the mind, chiseled by the mind, sculptured by the mind." (1994: 3). The structure of our mind is shaped in turn by the billions of years of universal evolution that preceded us. We are undeniably a part of the universe, a part which is capable of *reflecting back upon itself.* Evolution has shaped us, and now we shape the cosmos, according to the sensitivities of our mind.

The mind of the human, like the mind of any organism, is not merely that which processes abstract information. Mind is to be conceived as "the total capacity of the organism to react intelligently and purposefully" (p. 17). This total mind (which he calls Mind II) is what determines the nature of reality for the given organism. Mind II, when merged with reality, comprises a new, enlarged entity that he calls Mind III – 'mind/reality'.

This fusion of mind and reality has a long philosophical legacy: the union of the knower and the known; or as Skolimowski says, "the observer and the observed merge inseparably" (p. 34). It has its roots in Empedocles' concept that 'like knows like', and is articulated beautifully by Campanella and Goethe, among others. To this insight Skolimowski adds a strong *evolutionary dimension*, one which links mind and cosmos: "the becoming of the universe is inseparable from the becoming of the mind" (ibid). In the 20th century only Teilhard has taken evolution so seriously.

As mind reaches out and imposes order on reality, it defines the limits of what can be called 'real'. An amoeba has (relatively) very limited sensitivities, and thus maps out a relatively limited and simple reality. Reality for it is what it can grasp and comprehend. An automobile, an airplane, or a star literally do not exist, are 'unreal', from the perspective of the amoeba[14]. Likewise for humans: the structure of the atom and the structure of the universe *as we conceive them* represent the limits of our minds. The dynamics of the mind carve out of the 'primordial chaos' a coherent structure that we call reality. We never see this reality 'as it is', but only as reflected in the present state and sensitivity of our minds. As Skolimowski says, "*the outer walls of the cosmos are the inner walls of the mind*" (p. 81). He depicts the dynamics of mind as tracing out a *spiral*, which precisely matches with the boundaries of what we call reality; this is his "spiral of understanding". Furthermore, as the human evolves and changes over time, the mind changes, the sensitivities change, and therefore the walls of the cosmos change. An enlargement of mind equates to an enlargement of reality.

Skolimowski is adamant that such a participatory theory mind is not 'relativist', as the term is usually applied. Standard (cognitive) relativism holds that no epistemic perspective has a privileged perspective on truth or reality; therefore, reality is simply 'what we want it to be', and no larger frameworks have any claim on veracity[15]. Skolimowski points out that we do not simply choose reality, but we are limited by the structure of our physical and mental sensitivities, by our evolutionary heritage. All *homo sapiens* share a common basic set of physical sensitivities, and thus it is proper to speak of a *'human-specific' reality*. This is not relativist, except in the sense that it is relative to other species or other objects. (This is what Skolimowski means when he says that reality is "species-specific".)

Similarly, the one species of mankind has many cultures, each of which have evolved different value systems and epistemic norms. These constitute the 'mental sensitivities' of people, and also shape reality. In this sense, reality is "culture-bound". Reality varies between cultures, but is relatively consistent within a given culture.

Finally, each person has unique perspectives, unique values, and unique sensitivities that uniquely shape his or her own personal perspective on reality. There exists an 'individual spiral of understanding' that represents the unique outlook of each person. This may be called subjectivist or relativist, but only in a very limited sense. The personal aspect of reality is only one small dimension of the larger reality shared by the culture or the species. The fact that I am a member of the human species determines to a large degree how I can conceive of reality; the fact that I live in Western civilization, in America, further limits and defines aspects of my total reality. My unique perspectives cause my personal understanding of reality to be unique, but the larger part of it is shared by many other people. This fact accounts for effective communication between people, and the presence of viable societies. This is what Skolimowski calls "inter-subjective" (or "trans-subjective") reality.

On a practical level, such a worldview has definite methodological and ethical consequences. Skolimowski outlines what he calls a "participatory research programme" based on the concepts of *responsibility*, *empathy*, and *wholeness* (cf. p. 153). This 'methodology of participation' is offered as an alternative to the standard scientific 'methodology of objectivity'. At the individual level, Skolimowski calls for a transformation to a participatory consciousness. He suggests a number of possible strategies, including in-dwelling, empathetic identification, meditation, even prayer. The point is to make one aware of the conditioning and deeper assumptions that one acquires through one's surroundings and culture, to become aware of the values that guide ones actions, and to envision and create new assumptions and new forms of behavior that are more life-enhancing, fulfilling, and reverential. His goal is encourage the adoption of a participatory mind-set that is congruent with the vision of the participatory universe. Such actions cannot be justified from within the present (objectivist, mechanistic) worldview; they simply do not make sense, because they lie outside the bounds of the 'standard methodology' which is justified and self-sustained by that worldview itself. Only by understanding the larger role of worldviews can we understand this, and take appropriate action.

As comprehensive and detailed as it is, Skolimowski's system of participatory philosophy stands to be extended in at least one dimension. This is related to his emphasis on the human perspective of the participatory cosmos; *he focuses almost exclusively on the human as subject and participant.* This neglects two aspects: First, there is the impact on the 'object'. As Schiller has pointed out, all acts of perception *change the object of perception.* Whether the object is another person, an animal, an 'inanimate' object, or an entire eco-system, the mode of perception has a definite impact on that which is observed. The methodology of objectivity treats all things (including animals) as senseless, insensitive objects to be used solely for human ends. This approach causes suffering, disruption, and damage to the objects of inquiry.

Second, and more importantly, there is the fact that *all things, as co-participants, create their own reality.* This is the 'panpsychist dimension' of participatory mind. Skolimowski speaks to this somewhat when he acknowledges the reality that is created by the amoeba or other simple life forms. But from the standpoint of participatory panpsychism, *all things, all objects, co-participate and co-create reality.* When we confront an object of inquiry, *it confronts us.* We engage with it not as 'knower' engaging 'known', *but as co-participants, each being simultaneously knower and known.* Such a cognitive exchange yields a *noetic symmetry* between co-participants. This seems to me an important point, something that Skolimowski has not addressed in detail.

There are hints of panpsychist sympathies in Participatory Mind. For one, there is the strong support of Teilhard and his vision of complexity-consciousness -- which is inherently panpsychist. Also, numerous passages seem suggestive:

* the previously cited sentence that "the becoming of the universe is inseparable from the becoming of the mind";

* "[B]oth bodies and ideas (spirit) exist. But their existence takes different forms. What unifies these different forms of existence is the *evolutionary matrix*... All forms of being come from the same evolutionary barrel." (p. 27)

* single-celled animals having something approaching mind: "It is not fanciful to talk about reality for an amoeba." (p. 17)

* in the manner of Socrates: "The methodology of participation informs us that dialogue with our cells, and even with oaks and rocks, may not be far-fetched" (p. 359)

How can 'dialogue' occur, except between enminded entities? Still, Skolimowski is not explicit on the issue. The idea of 'participation' is obviously central in his work, as is the concept of a dialogue with the world, and yet he does not openly acknowledge the other half of the equation, the mirror image of the human mind – which can only be the *mind in nature.*

I see hylonoism as a natural extension of Skolimowski's theory of mind. It takes his central vision and extends it to all structures, to all forms of existence. Where Skolimowski's work might be said to be a '*special theory* of participatory mind' (special in that it focuses on the human mind), hylonoism may be seen as a '*general theory* of participatory mind', extending the basic insights in light of the new understanding offered by chaos theory.

Finally, the most recent book addressing the philosophy of participation is **Abram**'s The Spell of the Sensuous (1996). Appropriately, this book makes once again the connection between participation and animism/panpsychism, this time from a phenomenological perspective. Unlike Barfield and Berman, Abram argues for a return to an animistic vision of the natural world as a remedy to the radical separation from nature that emerged with Western civilization. His writing is more of a poetic essay than detailed philosophical inquiry (he cites neither Berman, Wheeler, nor Skolimowski); his objectives here are simply to provoke "new thinking" among intellectual circles, and to "provide a set of powerful conceptual tools...to alleviate our current estrangement from the animate earth" (p. x).

It is one thing to state the need for a return to an animated worldview, and another to explain why. Abram relies primarily on stories from aboriginal cultures, supplemented by his interpretation of Husserl and Merleau-Ponty. Most often, though, he simply states his beliefs as a matter of course -- as when he notes that "Magic is...the intuition that every form one perceives...is an *experiencing* form, an entity with its own predilections and sensations, albeit sensations that are very different from our own" (pp. 9-10). He argues for an almost traditional animism, one in which not only are animals and plants 'alive', "but also the meandering river from which those animals drink, and the torrential monsoon rains, and the stone that fits neatly into the palm of the hand. The mountain, too, has its thoughts." (p. 14). Abram is implicitly making the case that some form of indigenous animism is the preferred mode of interacting with the Earth, not the modern scientific mode of detachment and objectivity. His loose usage of terms like 'alive' and 'thoughts' indicates the poetic and experiential nature of his approach.

The phenomenological basis for Abrams' views comes from his reading of Husserl and Merleau-Ponty, in whom he finds the root of a participatory theory of perception. He finds significance in Husserl's intersubjective *Lebenswelt* ('life-world'), the pre-analytic world as presented directly to our perceptions. The life-world is the meeting place of mind and matter; as such, it involves and encompasses both at once. The extent to which this argues for an animistic worldview is not clear -- and is not evident in the writings of Husserl.

Abram then notes the importance of Merleau-Ponty's advancements, beginning with the latter's identification of the physical body as the 'true subject of experience'. Merleau-Ponty denied the transcendental ego or spirit, and equated the human subject with the body as a whole -- much like I argue that the body constitutes the 'total mind' of the human. Perceptual knowledge occurs when the body enters into a *relationship* with a sensible object. Sounding very much like Campanella, Merleau-Ponty states that the human projects into the sensory realm, and this projection is reflected back into the body -- "the sensible gives back to me what I lent to it" (Merleau-Ponty, 1945/1962: 214). In this way sensory data are best seen as "certain kinds of symbiosis, certain ways the outside has of invading us and certain ways we have of meeting this invasion" (ibid: 317). It seems clear that this is a deeply participatory approach to sensation and perception. Abram takes it a step further, citing Merleau-Ponty's use of active words with respect to the sensory environment, and reading into this animistic overtones (cf. Abram, 1996: 55). To my mind this is again an unwarranted interpretation -- certainly the case is far weaker than for the other philosophers I have addressed in this thesis.

Abram appropriates Levy-Bruhl's term 'participation' and applies it to the mode of perception that Merleau-Ponty is describing. Abram's conclusion is that "participation is a defining attribute of perception itself", meaning "perception always involves, at its most intimate level, the experience of an active interplay, or coupling, between the perceiving body and that which it perceives." (p. 57). True enough -- and yet this does not seem to justify his following statement: "Prior to all our verbal reflections...we are *all* animists." (ibid). Abram never makes clear why participation requires an animist perspective on the world. Levy-Bruhl *defines* participation animistically, but this is a different matter. Merleau-Ponty envisions a participatory epistemology, but is unclear about the necessity of a panpsychist worldview.

The most substantial argument that Abram makes occurs in one brief passage, in which he offers (in the manner of Schiller) an argument by analogy. He notes the possibility that "both the perceiving being and the perceived being are *of the same stuff*" (p. 67). He continues:

> Each of us [humans], in relation to the other, is both subject and object, sensible and sentient. Why, then, might this not also be the case in relation to another, nonhuman entity? ... Finally, then, why might not this

> "reversibility" of subject and object extend to every entity that I experience? ... I find myself forced to acknowledge that *any* visible, tangible form that meets my gaze may also be an experiencing subject... (ibid).

But the analogy as stated is not cogent. Simply because two people apprehending each other can be considered interchangeably as subject and object, there is no compelling reason to apply the same position to all objects. Schopenhauer's related analogy -- that I am an object, I possess a will, therefore all objects possess a will -- is logically more correct and convincing. Abram seems to simply take the two ideas of participation and animism, and merge them together -- more on the basis of his intuitions and experience with indigenous cultures than on firm philosophical ground. I agree with his intuition, of course, but I think a much stronger connection can be found between these two.

Finally, Abram makes an interesting conjecture regarding why modern culture has lost its animistic predilections: the emergence of the *written word.* Following the lead of Plato's *Phaedrus*, Abram claims that the written text has literally taken on an animistic demeanor, that we now attribute a 'voice' and 'spirit' to the black ink marks on white paper:

> [T]he animating interplay of the senses has been transferred to another medium, another locus of participation. *It is the written text that provides this new locus.* ... [T]he "inert" letters on the page now speak to us! *This is a form of animism...as mysterious as a talking stone.* And indeed, it is only when a culture shifts its participation to these printed letters that the stones fall silent. (p. 131)

Plato recounts Socrates' statement that writing "will introduce forgetfulness into the soul", and provide only "the appearance of wisdom" (*Phaedrus*, 275a) because men will come to trust in the static, written word. In doing so, they forego "the words of an oak", or a stone. Text comes to replace nature as communicator of truth. In the process, Abram claims, the text becomes deified and animate.

In my view language does in fact play a significant role, as it is the means by which information is exchanged among people in the social setting. 'Language-as-information-exchange' is a part of the larger phenomenon of energy exchange that accounts in part for the power and intensity of mind, in particular of the social mind. I examine this notion further in Part III.

6) Recapitulation of Part II

My objective in the preceding two chapters was four-fold: (1) to demonstrate that panpsychism was in fact a significant and unacknowledged undercurrent of Western philosophy, (2) to examine the history of participatory thinking, (3) to show that this participatory thinking often goes hand-in-hand with panpsychist ideas, (4) to demonstrate that the vision of participatory mind obtained from hylonoism is compatible with historical concepts of mind, and in fact provides a greater illumination and greater sense of explicability than would otherwise be the case.

Expanding on this last point: Hylonoism offers an account of mind that unifies the disparate intuitions and conjectures of thinkers throughout history. No other theory can as consistently incorporate this variety of insights – mind as a single point, mind as a structured hierarchy, mind as pervasive in all things. Even the various philosophers themselves were unable to provide a reasonable explanation for their views; they most often made flat statements of belief, unsupported by philosophical reasoning. As such, these views have been a source of puzzlement and embarrassment to the philosophical establishment of the 20th century. Through the new language of chaos theory, these intuitions become more comprehensible and lucid than ever before.

I have shown that participation and panpsychism are closely and deeply intertwined, and this fact argues strongly for my central thesis that *participatory panpsychism* stands as a viable and perhaps inevitable next phase in the evolution of Western philosophy. My emphasis in Part II has been on the philosophical lineage of participation and panpsychism. However, such concepts have emerged as well from within the disciplines of traditional science and physics, particularly in the past 100 years. I begin Part III with an overview of scientific perspectives on these two concepts (especially panpsychism). This will serve to strengthen my case that panpsychism has persisted, and in fact seems to be reemerging – in the guise of participatory panpsychism – as a leading worldview of the 21st century.

NOTES:

[1] All Ethics quotations are from Curley (1994).

[2] Section #48 of the Monadology recites almost verbatim Campanella's three primalities: "God has *power*, which is the source of everything, *knowledge*, which contains the diversity of ideas, and finally *will*, which brings about change or products in accordance with the principle of the best." (1714b: 219). Granted he attributes these properties to God, but he goes on to explain that they are present "by imitation" in all monads. Leibniz nowhere quotes Campanella directly but he was clearly aware of his work (cf. e.g. "Against Barbaric Physics", in Ariew and Garber, 1989: 314).

[3] With evident disdain, Popper writes, "Schopenhauer is a Kantian who has turned panpsychist." (1977: 68).

[4] Cited in Magee (1983: 161).

[5] A surprisingly similar theory has recently been put forth by Ervin Laszlo, in his book The Systems View of the World (1996).

[6] James comments that paranormal phenomena provide strong evidence for this view: "I find in some of these abnormal or supernormal facts the strongest suggestions in favor of a superior co-consciousness being possible." (p. 299).

[7] Peirce actually presented the beginnings of his view in 1891 (see his 1891/1992: 293), where he comments in passing that "matter is effete mind".

[8] When all of reality is understood as interconnected, any one effect has implications on all things. This has a literal, physical basis, which I will examine later.

[9] See my discussion in Chapter 1 (footnotes).

[10] Bergson's intellectual heir, Teilhard de Chardin developed the concept of panpsychism into a complete world-system, putting it at the heart of his theory of cosmic evolution. Teilhard saw mind as related to a feedback-like phenomenon that he called "doubling back". In his main work The Phenomenon of Man he writes:

> [W]e are logically forced to assume the existence in rudimentary form...of some sort of psyche in every corpuscle, even in those (the mega-molecules and below) whose complexity is of such a low or modest order as to render it (the psyche) imperceptible... [T]he universe is, both on the whole and at each of its points, in a continual tension of organic doubling-back upon itself, and thus of interiorization. (1959: 301-2)

His theory of 'complexity-consciousness' – that mind and spirit increase in intensity with increasing structural complexity – has clear connections to both Spinoza and hylonoism. The full implications of Teilhard's panpsychism are too expansive to address within the bounds of this thesis.

[11] For a good discussion of this concept that "mind-object relations have analogues at each level of finite existence", see Brettschneider (1964).

[12] Elsewhere Hartshorne calls Leibniz's position "the first clear statement of panpsychist theory" (1950: 444), apparently overlooking all the developments of the early Greeks and the Renaissance naturalists.

[13] Though he does return to the language of participation somewhat in his Janus (1978) – cf. footnote on page 58.

[14] This is not to say, of course, that the amoeba has no perception at all of large-scale objects. The exhaust from the plane or the tire of the auto may certainly affect the state of the amoeba, in which case it will clearly comprehend *something* of these things. But it will never comprehend them as whole, complete objects.

[15] This is the view typically held by postmodern deconstructionists.

PART III: TOWARD A GENERAL THEORY OF PARTICIPATION

Chapter 7 – Scientific Perspectives on Participation and Mind

1) The Scope of Part III

Let me take a moment to briefly reexamine the developments in this thesis so far, and lay the groundwork for this final Part III. To reiterate my main theme: the path of Western civilization and philosophy over the past 2500 years has been one of a departure and detour from the more ancient worldview of an animated cosmos. This departure has yielded many gains in knowledge and technology, but has been achieved at a cost: estrangement from the natural ground of being. *Homo sapiens*, as a thinking, enminded creature, cannot indefinitely operate as though he were fundamentally unique, alone possessing the qualities of mind. The consequences of this radical separation of humanity from nature are now becoming evident, particularly in the problems arising from within the dominant Mechanistic Worldview.

The imperatives of our time call for a return to an animated, panpsychic vision of the universe. In Part II, I have shown that this panpsychist perspective has never been completed eliminated, and has in fact has been advocated by many of the greatest thinkers in the history of Western civilization. Furthermore, evidence is building that we are approaching the point where we can begin to re-envision a sympathetic, panpsychic worldview, one that is described in the language of participation.

Part II was an attempt to articulate the Partimens, the *mental aspect* of Participatory Reality. Part III focuses on the other, *material aspect*, that which I have called the Partimater. Here I examine the general notion of exchange, first in a social setting and then more broadly. Exchanges of mass and energy in the material realm co-exist with the dynamics of mind in the mental realm.

Not only philosophers, but also noted scientists of the 20th century have seen cause to advocate versions of panpsychism. Evolution, quantum mechanics, and chaos theory have all been employed to argue for panpsychism (hylonoism being an example of the latter). I begin Part III with a transition from the Partimens to the Partimater, by investigating the evolutionary and quantum mechanical bases for panpsychism. These indicate that the scientific worldview itself is spiraling back to embrace aspects of the original, pre-Western worldview. The evidence from the realm of science constitutes the beginning of this chapter.

A comprehensive theory of participatory panpsychism must look both down and up the hierarchy in the Great Chain of Being. After completing my investigation of the scientific views of mind in nature, and in the particles of nature, I will sketch a larger general theory of participation that encompasses social organizations, eco-systems, and large-scale systems of mind.

2) Panpsychism in 20th Century Science

The objectivism of science offers neither explanation nor accounting for the phenomenon of mind. Mind in humans is an unexplained, and perhaps unexplainable, mystery to science. Mind that may exist elsewhere in nature is scientifically unintelligible and superfluous. Modern analytic philosophy supports both this view of mind and the Mechanistic Worldview generally, and hence sees no credibility in panpsychic theories. The concept of participation likewise lies primarily outside the bounds of conventional science: from Levy-Bruhl's description of it as 'prelogical' and mystic, to Hartshorne's participatory concept of 'organic sympathy, to Berman's and Abram's ideas of animistic participation, to Skolimowski's Participatory Worldview.

And yet there is significant evidence that both panpsychism and participation can be found within the realm of science. As I see it, the pressure of this underlying *Weltanschauung* is causing itself to be revealed even in the hostile environment of a Mechanistic Worldview. I have already shown how Wheeler's vision of participation emerged in the context of quantum mechanics. Numerous other scientists have found grounds for panpsychism, in the fields of physics, chemistry, and biology. Here I will show not only what they believed, but something of how and why they came to their conclusions. The confluence of panpsychism and participation reaches a peak in the work of David Bohm.

I have already examined the ideas of the scientist-philosophers of the 19th century. Among these, Fechner stands out as the most significant, but the panpsychism of Lotze, von Hartmann, Haeckel, Clifford, and Mach were important predecessors to developments in the 20th century. Apart from Fechner (who lived before Darwin), the critical issue for these thinkers was the theory of evolution. Evolution unified natural phenomena, especially life, and this allowed people to see life emerging in a kind of continuous process from non-life. A natural conclusion then was that consciousness and mind inhered in all matter, and only became visible to us in the structures that we call life. James noted, in an earlier citation, that a panpsychic hylozoism must be "an indispensable part of a thorough-going philosophy of evolution" (op.cit.). Peirce argued from the perspectives of mathematics and physics that "all mind more or less partakes of the nature of matter" (op.cit.), and saw chaotic dynamics as key in this process. Others, like Bergson, argued (somewhat ambiguously) that mind was a creative phenomenon that emerged *de novo* in the course of universal evolution. This leaves the process of emergence as mysterious and perhaps inscrutable, and introduces troublesome instances of 'drawing a line' somewhere in the sequence of structural complexity. Rather, I think that we need to *redefine the concept of emergence*, to more adequately account for the appearance of the new within a connected process of universal evolution[1].

To many scientists of the early 20th century, panpsychism was uncomfortably close to the recently discredited theory of vitalism. As a result they largely avoided discussion of it altogether. The first notable scientist to tentatively put forth panpsychist views was the British astronomer Sir Arthur Eddington. His Space, Time and Gravitation (1920) concludes with the observation that physics only addresses the surface structure of matter and energy, and does not have anything to say about the 'inner content' of reality. Arguing roughly in the manner of Schopenhauer, Eddington claims that the inner content of reality must be like the inner content of the human, i.e. conscious:

> [Physics] is knowledge of structural form, and not knowledge of content. All through the physical world runs that unknown content, which must surely be the stuff of our consciousness. (p. 200)

It is difficult to determine precisely the meaning of this passage; it can be read either as a form of idealism or as panpsychism (though of course Schopenhauer's argument was clearly panpsychic). Eddington again addresses this theme in 1939, leaning more toward idealism. He argues that physics "abolishes all dualism of consciousness and matter" (1939: 150). Dualism, he claims, contains a logical inconsistency: "Dualism depends on the belief that we find in the external world something of a nature incommensurable with what we find in consciousness" (ibid). Since physics shows that all reality is structurally the same, it must all be commensurate with consciousness, i.e. of the nature of a mental sensation. He elaborates:

> Although the statement that the universe is of the nature of 'a thought or sensation in a universal Mind' is open to criticism, it does at least avoid this logical confusion. It is, I think, true in the sense that it is a logical consequence of...our knowledge as a description of the universe. (p. 151)

His reference to a universal Mind sounds very Berkelian -- matter as consciousness only with respect to an observing mind, not as a mind in itself. Eddington's argumentation comes across as a bit confused, but his intention seems clear: that the unified view of physics supports a belief that the content of reality is comparable and even equivalent to the content of mind.

Biologist J.B.S. Haldane speculated on mind in nature in the early 1930's. He addressed the issue of emergence of life and mind from inanimate matter, noting, "it is clear that aggregates of a certain kind do manifest qualities which we cannot observe in their components" (1932: 113). This is an important and subtle observation; Haldane did not say that emergent qualities 'do not exist' in their components, but rather that 'we cannot observe them'. Mind, he suggests, (and 'life' as well) may be found to exist in an unobservable form in all matter.

In fact if consciousness were not present in matter, this would imply a theory of 'strong emergence' that is fundamentally anti-scientific. Such emergence "is radically opposed to the spirit of science, which has always attempted to explain the complex in terms of the simple..." (ibid). Haldane rejects this thesis, and hence is driven to the conclusion that life and mind exist to some degree everywhere:

> We do not find obvious evidence of life or mind in so-called inert matter, and we naturally study them most easily where they are most completely manifested; but if the scientific point of view is correct, we shall ultimately find them, at least in rudimentary form, all through the universe. (ibid)

Two years later he offers thoughts on the philosophical implications of quantum mechanics. In "Quantum mechanics as a basis for philosophy" (1934), Haldane proposes that mind is a "resonance phenomenon" that is associated with the wave-like aspect of atomic particles (recall that particles exhibit both 'particle' and 'wave' behavior, depending on how they are observed). This is a reasonable assertion, he claims, because the characteristics of mind are comparable to those of atomic particles: both arise from dynamical systems, both exhibit a continuity and wholeness, both are at once localized yet spatially diffused. For example, the wave-nature of an electron allows it to penetrate through an insulating barrier (the 'tunneling effect'), and this Haldane interprets as a primitive variety of "purposive behavior". He offers the suggestion that "man also has a 'wave system' which enables him to act with reference to distant or future events, this system being his mind" (p. 89). Anywhere this resonance phenomenon occurs, there we must accept the presence of mind. Haldane speculates that this may happen even in the interior of stars:

> It is not inconceivable that in such [stellar] systems resonance phenomena of the complexity of life and mind might occur. ... [I]t is conceivable that the interior of stars may shelter minds vastly superior to our own, though presumably incapable of communication with us. (p. 97)

Haldane had previously cited Plato, and one cannot help but suspect that he had Plato's 'star-souls' in mind[2].

Physicist and astronomer Sir James Jeans was likewise drawn to philosophical speculations on mind. Like Eddington, he sees evidence for mind throughout nature, and concludes that a form of idealism must be true: "the universe can be best pictured...as consisting of pure thought" (1932: 168). Jeans is clear that this conception undermines the Mechanistic Worldview: "the universe begins to look more like a great thought than like a great machine. Mind no longer appears as an accidental intruder into the realm of matter" (p. 186). In a later work Jeans arrives at a strongly Berkelian idealism (or "mentalism"). He argues that the new physics provides three substantial reasons for seeing reality as "wholly mental": (1) electro-magnetic fields fail to qualify as 'objective', and hence are effectively "not real at all; they are mere mental constructs of our own" (1942: 200); (2) the reality of the theories of physics is essentially mathematical, and therefore essentially mental; (3) as Haldane suggested, the wave-particle duality implies a view in which "the ingredients of the particle-picture are material, those of the wave-picture mental. ... [T]he final picture consists wholly of waves, and its ingredients are wholly mental constructs." (ibid: 202). Like Eddington, Jeans' philosophical naiveté pushes him toward a Berkelian idealism, when in fact panpsychist explanations are equally viable and perhaps more reasonable.

In the early 1940's three notable British biologists ventured theories that had panpsychist dispositions. The physiologist Sir Charles Scott Sherrington is noted for his research on the physiology of the brain, but in Man on His Nature (1941) he delves into mind-brain philosophy. Sherrington argues (not unlike Bruno) for a dual-aspect theory of reality, 'mind' and 'energy': "our world resolves itself into energy and mind. These two concepts...divide, and between them comprise, our world." (p. 348). He is agnostic regarding interaction between these two realms, stating that we are left with

> acceptance of energy and mind as a working biological unity although we cannot describe the how of that unity. ... The evolution of one is of

> necessity the evolution of the other. There is no causal relation between them; they are both inseparably one. Their correlation is unity. (pp. 351-2)

One consequence of this view is that the animate and 'mental' blend seamlessly into the inanimate: "We have difficulty in assigning the lower limit of the mental. It may therefore be that its distribution extends to all organisms, and even further." (p. 354). In other words, "it is as though the elementary mental had never been wanting" (p. 266) – that is, present in all matter throughout the history of evolution.

The second notable voice was W.E. Agar. Agar was a follower of Whitehead's process philosophy, and was intrigued by Whitehead's concept of the 'philosophy of the organism'. He seeks a biological theory of the living organism that corresponds to Whitehead's philosophy. His central thesis is that organisms are both percipient subjects and composed of elements (cells) that are themselves percipient; living cells "must also be regarded as feeling, perceiving, subjects" (1943: 8). The logic continues down the chain of being: "A cell, though a subject, must probably also be considered a nexus of living sub-agents." (p. 11).

Agar is clear that "Whitehead's system essentially involves a form of panpsychism" (p. 66), and his analysis demonstrates a deeper philosophical awareness than the other scientists I have discussed. Agar accepts most aspects of Whitehead's process philosophy, but disagrees with him on the nature of consciousness. Whitehead sees consciousness as a special and limited case of the more general phenomenon of feeling or experiencing; Agar believes that

> the more satisfying hypothesis is that...all experience is in its degree conscious. ... [W]e must ascribe consciousness to every living agent, such as a plant cell or bacterium, and even (if the continuity of nature is not to be broken) to an electron. (p. 91)

Agar's panpsychism is thus more thorough-going and explicit than that of Whitehead.

Third is Sir Julian Huxley. Arguing like the others that physics and evolution have demonstrated the underlying unity of reality, Huxley takes a strongly monist perspective. Given that both mind and matter exist, monism requires that these be deeply linked. Adopting a Spinozist ontology, he says that "there exists one world stuff, which reveals material or mental properties according to the point of view" (1942: 140); the 'material' is reality "from the outside", and the 'mental' is "from within". If we accept the continuity of mind and matter that science imposes,

> then mind or something of the nature as mind must exist throughout the entire universe. This is, I believe, the truth. We may never be able to prove it, but it is the most economical hypothesis: it fits the facts much more simply...than one-sided idealism or one-sided materialism. (p. 141)

This is perhaps the clearest and most unambiguous statement of any of the early-20th century scientists. In fact, the arguments of Huxley and the others above so closely link panpsychism with the scientific worldview that one is inclined to see panpsychism not as a *usurper* of Mechanism, but rather as a mere *logical extension* of it. I explain this as follows: science does in fact reveal some 'truth' about the nature of reality, a reality which has an inherent psychic or noetic quality. Sooner or later science will be required to acknowledge this. Thus science, in spite of its own presumptions about the inanimateness of the world, is driven to recognize the deeper panpsychic reality. As a consequence, the very structure of the scientific worldview is altered – science must ultimately undermine its own presumptions. Then a new worldview will emerge to take its place, one that must necessarily come from outside the bounds of conventional, mechanistic modes of thinking.

It was then a 10-year gap until the publication of zoologist Sewall Wright's article "Gene and organism" (1953). Wright, then-president of the American Society of Naturalists, picked up Agar's (and Whitehead's) argument that the concept of 'organism' should apply to all structures of matter. He defines an organism as any structure in which interrelated parts communicate and cohere in a persistent and self-regulatory manner. He notes that the concept applies not only to plants and animals, but to human society, and even – anticipating Gaia theory – to the Earth's biosystem as a whole:

> [T]he entire array of plants and animals and peripherally the soil and waters of a given region [constitute] an interdependent self-regulatory system, with considerable persistence... Since regions [of the Earth] are connected, the entire biota and peripherally the surface of the earth form one great organism. (p. 7)

This is the first recognition since the work of Fechner that the Earth may be considered as a single organic entity. Furthermore, not only the Earth, but the solar system individually and the universe as a whole qualify as organisms. At the other end of the scale, atoms and molecules are to be considered organisms; subatomic particles are questionable (not having parts), but Wright feels that their 'vibratory character' and persistence put them in the same general category.

As to the question of mind, Wright again invokes an argument by continuity, showing that mind must exist in single-celled organisms, and even in their constituent parts: "If we are not at some point to postulate the abrupt origin of mind, mind must be traced to the genes, which presumably means to nucleo-protein molecules." (p. 13). This has implications for humans, because it entails that "our own apparently unified stream of consciousness is somehow a fusion of the minds of the cells" of our bodies. Wright ultimately concurs with Eddington and Jeans, that "the essential nature of all reality is that of mind" (p. 16), though he does acknowledge that his is more of a pluralistic idealism: "reality consists primarily of a multiplicity of minds" – a critical issue from the panpsychist perspective.

Finally, he makes a statement that is fully in agreement with hylonoism; namely, that *mind is correlated with degree of interaction between parts*: "In tightly knit organisms...there is such an incessant interaction among parts as to indicate a high degree of integration of mind." (pp. 14-15). Participatory exchange is thus seen by

Wright to correspond to a kind of intensity of mind. Larger-scale systems exhibit the same quality but at a scale beyond ordinary comprehension. The more loosely-knit organizations of societies or planetary ecosystems exist at vastly different scales of space and time, and this fact "may make it...impossible for the human mind to grasp the unity of the whole" (ibid).

Wright elaborated on his panpsychist views over the subsequent 20 years. Writing in the journal The Monist in 1964, he explicitly argues for "dual-aspect or monistic panpsychism". He presents a 'hierarchy of mind' in which each level in the chain of being is enminded, and participates in higher-order mind: "The very fact of interaction, at any level, implies...that minds are not entirely private. ... They [also] exist as components of a more comprehensive mind..." (1964: 284). Then in 1977 he contributes an article to Cobb and Griffin's compilation Mind in Nature. His article, "Panpsychism and science", reiterates the same themes, and places even more emphasis on the problem of emergence: "Emergence of mind from no mind at all is sheer magic." (1977: 82). Dual-aspect panpsychism, Wright says, is the only logically-consistent position.

The 1960's and 70's witnessed a number of new scientists speaking out on behalf of their panpsychist views. Biologist Bernhard Rensch published half a dozen pieces arguing for "panpsychistic identism", beginning with his 1960 book Evolution Above the Species Level. Here he repeats the evolutionist line that "because of [a] lack of any serious evolutionary gap", one cannot limit mental abilities to the higher organisms. Even the gap between living and non-living systems is illusory:

> Here again it is difficult to assume a sudden origin of first psychic elements... It would not be impossible to ascribe 'psychic' components to the realm of inorganic systems also... (p. 352)

This "hylopsychic" view, Rensch claims, finds substantial support from cognition theory and atomic physics. He concludes that "a hylopsychic concept is well in accord with many findings and facts of the natural sciences, and...is possibly the most suitable basis for a universal philosophy." (p. 355). His (1971, 1972, and 1977) all offer further articulation, and present an impressive array of scientific arguments for panpsychism.

C.H. Waddington wrote The Nature of Life in 1961, and he discusses approvingly the ideas of Haldane that I mentioned above. Once again citing evolutionary continuity, Waddington asks:

> Are we not forced to conclude that even in the simplest inanimate things there is something which belongs to the same realm of being as self-awareness? ... [S]omething must go on in the simplest inanimate things which can be described in the same language as would be used to describe our self-awareness. (p. 121)

In a break from the evolutionary-continuity approach, the physicist A. Cochran (1971) extends Haldane's suggestion and argues that the laws of quantum mechanics in themselves support a panpsychist philosophy[3]. In an ingenious approach, Cochran observes that the atoms of *organic* compounds (carbon, hydrogen, nitrogen, and oxygen) have among the lowest 'atomic heat capacities', which corresponds to a high degree of 'wave predominance' (as opposed to 'particle predominance'), and hence are the most endowed with the qualities of consciousness. He offers that "the quantum mechanical wave properties of matter are actually the conscious properties of matter", and therefore "atoms and fundamental particles have a rudimentary degree of consciousness, volition, or self-activity" (p. 236).

Cochran's article was published just one year before Wheeler's initial articulation of the participatory physics and the "participatory universe", at the 1972 conference in Trieste that I discussed in Chapter 1. As I have noted, Wheeler developed a participatory vision without panpsychism. Other scientists, as I have just shown, came to accept variations of panpsychism without the concept of participation. These two ideas were linked in the thought of two of the most important scientist-philosophers of the 20th century, Gregory Bateson and David Bohm.

3) Bateson and Bohm

Bateson researched and wrote on a wide range of subjects, including biology, anthropology, psychology, cybernetic theory, and natural philosophy. A contrarian to the trend of increasing specialization, Bateson was uniquely qualified to comment on the interconnection between nature and mind. His vision of ecological philosophy and the interrelationship between organic wholes was a predecessor to the more fully developed eco-philosophies of Skolimowski and other environmental philosophers. And his awareness of the importance of concepts like energy, feedback, and information anticipate elements of chaos theory, and hylonoism[4].

Bateson's inquiry into mind and nature brought him to a qualified version of panpsychism, though he seems to have ultimately abandoned it – for reasons that are not entirely clear. His first inquiries in this area occurred in 1968, in the article "Conscious purpose vs. nature" (1968). Here he expresses his belief, not unlike the other scientist-philosophers of the century, that "the study of evolution might provide an explanation of *mind*" (p. 35). His first point of note is that mind is essentially a natural phenomenon, bound up with the complexity of matter. He cites approvingly Lamarck's view that "mental process must always have a physical representation" (p. 36); and furthermore, "wherever in the Universe we encounter [a certain degree] of complexity, we are dealing with mental phenomena" (ibid). In an attempt to elaborate this matter, Bateson observes that complex dynamic systems involve a process of feedback, such that they are 'self-corrective'. Examples of natural self-corrective systems include the individual organism, a society of organisms, and the surrounding ecosystem. All these levels of organization embody comparable system dynamics, and -- by implication -- should exhibit qualities of mind. To use his example, a forest ecosystem like an 'oak wood' is fundamentally like an individual organism, reflecting mind from within its bodily, material structure. In an intriguing comment, Bateson refers to this kind of embodied mind as 'total mind': "This entity [i.e. the individual organism] is similar to the oak wood and its controls are represented in the *total* mind, which is perhaps only a reflection of the total body." (p. 40). But Bateson leaves it here, and only later follows up on the implications.

His 1972 compilation Steps to an Ecology of Mind includes the above article as well as a number of other important pieces. Preeminent among these is "Form, substance, and difference" (originally published in 1970). Here Bateson first cites his famous but vague definition of *information* as "difference which makes a difference" (1970: 7). He is attempting to relate the phenomenon of mind to feedback systems of energy circulation, and decides that it is 'pure difference' that matters most. In my mind, this difference must necessarily be a difference in *energy*; Bateson seems to disagree, but does not offer a convincing explanation why.

Regardless of whether one views natural feedback systems as consisting of 'differences in energy' or simply 'differences', Bateson is adamant that it is the *circular feedback system itself* that is important -- it is in such a system that we observe what can rightly be called 'mind'. He is quite explicit on this issue:

> The elementary cybernetic system with its messages in circuit is, in fact, the simplest unit of mind; ... More complicated systems are perhaps more worthy to be called mental systems, but essentially this is what we are talking about. (1972: 459)
>
> We get a picture, then, of mind as synonymous with cybernetic system... (ibid: 460)

This view is very close in spirit to hylonoism, which sees mind in all interactive exchanges of energy. I concluded that, therefore, mind must exist in hierarchic form throughout all levels of being; Bateson reaches the same conclusion: "we know that within Mind in the widest sense there will be a hierarchy of subsystems, any one of which we can call an individual mind" (ibid). It is not just 'universal Mind', but mind at all levels of existence – true pluralistic panpsychism[5].

Bateson's elaboration makes clear that his conception of mind extends not only to small cybernetic systems, but large-scale ones as well:

> It means...that I now localize something which I am calling "Mind" immanent in the large biological system – the ecosystem. Or, if I draw the system boundaries at a different level, then mind is immanent in the total evolution structure. (ibid)

> The individual mind is immanent but not only in the body. It is immanent also in pathways and messages outside the body; and there is a larger Mind of which the individual mind is only a subsystem. This larger Mind...is still immanent in the total interconnected social system and planetary ecology. (ibid: 461).

Still, Bateson does not endorse a full-fledged panpsychism. The only exceptions for him are the fundamental atomic particles ('atomies'). These particles, being without parts, lack the dynamic interrelationships that Bateson sees as necessary for the process of mind. A footnote of his is interesting:

> I do not agree with Samuel Butler, Whitehead, or Teilhard de Chardin that it follows from this mental character of the macroscopic world that the single atomies must have mental character or potentiality. I see the mental as a function only of complex *relationship*. (ibid: 465)[6].

This is perhaps a minor issue, and does not substantially affected his generally panpsychist outlook.

One other important point in this article: Bateson realizes that such a view of mind has not only strictly philosophical implications but significant *ethical* ones as well. If, he says, you adopt the conventional objectivist materialist view of mind, then

> you will logically and naturally see yourself as outside and against the things around you. And as you arrogate all mind to yourself, you will see the world around you as mindless and therefore not entitled to moral or

> ethical consideration. The environment will seem to be yours to exploit. (ibid: 462)

This strongly suggests, as I have argued, that panpsychism – in conjunction with a participatory philosophy – can serve as the basis for a holistic and compassionate worldview.

In 1979 Bateson came out with his most philosophical book, Mind and Nature: A Necessary Unity. Interestingly, in this work he seems to back away from the panpsychist implications of his earlier writings – though maintaining the same theory of mind, with presumably the same consequences. Mind still exists in the interrelationship and interaction between dynamic parts. But now this is only a necessary, not sufficient condition for mind. He lays out six somewhat-cryptic criteria[7] for complex systems to possess mind, and notes that *any* system meeting these criteria must be designated as such. The criteria are very general, and would seem to apply to any dynamic system whatsoever. And yet, he excludes not only (as before) subatomic particles, but certain other physical systems as well:

> There are, of course, many systems which are made of many parts, ranging from galaxies to sand dunes to toy locomotives. Far be it from me to suggest that all of these are minds or contain minds or engage in mental process. The...galaxy may become part of the mental system which includes the astronomer and his telescope. But the objects do not become thinking subsystems in those larger minds. The [six] criteria are useful only in combination. (1979: 104)

This statement is quite puzzling, and inconsistent with his own criteria. If his criteria are valid, they should be valid universally. They appear to occur "in combination" everywhere. Something caused Bateson to back away from the logical implications of his own theory, implications that he had seemingly accepted a few years earlier. Bateson had strong intuitions about the nature of energy and feedback and their relation to mind, yet he was ultimately unable to construct a cohesive and consistent theory of mind.

Like Wheeler, David **Bohm** had a long-standing interest in developing the philosophical implications of quantum physics. He wrote numerous pieces on the philosophy of physics, and seems to have been especially interested in the process of mind. More than any other scientist-philosopher, Bohm joins panpsychism and participation into a single view of physical reality.

His interest in panpsychism began as early as 1957, in his book Causality and Chance in Modern Physics. Here he makes only one passing reference to the concept, in the midst of a discussion of his idea of 'strong emergence', i.e. that "new qualities and new laws" can appear because of the "universal process of becoming" (1957: 163) that dominates the universe. Bohm notes that processes of living matter do not fundamentally differ from those of nonliving matter: "when one analyses processes taking place in inanimate matter over long enough periods of time, one finds a similar behaviour [to living processes]. Only here the process is so much slower..." (ibid). An intriguing comment, if not a ringing endorsement.

Bohm edges closer to both panpsychism and participation in his work Wholeness and the Implicate Order (1980). The participatory dimension comes in his acknowledgement that quantum physics entails a fundamental interconnection between observer and observed:

> [The atom] can best be regarded as a poorly defined cloud, dependent for its particular form on the whole environment, including the observing instrument. Thus, one can no longer maintain the division between the observer and observed... Rather, both observer and observed are merging and interpenetrating aspects of one whole reality, which is indivisible and unanalyzable. (p. 9)

Such a passage recalls the comments of Wheeler, but Bohm does not cite him.

Bohm states that quantum theory presents a fundamental challenge to mechanism because it (A) exhibits radically 'discontinuous' (quantized) behavior, (B) displays simultaneously wave-like and particle-like properties, and (C) demonstrates extreme 'non-locality' – a phenomenon in which coupled particles form an instantaneous relationship over any distance whatsoever (leading to a form of 'communication' that exceeds the speed of light). In fact, he notes that the structure of the universe "is much more reminiscent of how the organs constituting living beings are related, than it is of how parts of a machine interact." (p. 175).

He goes on to argue for a form of neutral monism, wherein "both inanimate matter and life [are comprehended] on the basis of a single ground, common to both" (p. 193). Repeating his earlier observation, he comments that "even inanimate matter maintains itself in a continual process similar to the growth of plants" (p. 194). In the same way that this "common ground" unites living and non-living, so too does it unite mind and 'no-mind'; or as Bohm says, "the implicate order applies both to matter and to consciousness" (p. 196). Both sets of dualities are seen by him as *fundamentally mistaken*. The dualities are false. Consequently, there is a sense in which all matter is both 'alive' and 'conscious'. In his words, "in a wide range of...important respects, consciousness and matter in general are basically the same order (i.e. the implicate order as a whole)." (p. 208).

Panpsychism is a natural consequence of such a view. Psychic qualities are seen in all things, all systems. Like *memory*, for example. "The recurrence and stability of our own memory...is thus brought about as part of the very same process that sustains the recurrence and stability in the manifest order of matter in general." (ibid). If Bohm seems less than decisive here regarding panpsychism, later works are more explicit.

Interestingly, Bohm also observes a point that I have made with hylonoism, namely, that the *higher-dimensional phase space constitutes a 'true' reality* of the world. He says that "the various [atomic] particles have to be taken literally as projections of a higher-dimensional reality which cannot be accounted for in terms of any force of interaction between them." (pp. 186-7). For example, two atoms that are traditionally seen as moving independently in three-dimensional space are more properly conceived as existing in a single six-dimensional mathematical space: "A system constituted of N 'particles' is then a 3N-dimensional reality, of which each 'particle' is a three-dimensional projection." (p. 188). Just as I argued that physical reality should be conceived in a vastly high-dimensioned phase space, so Bohm makes the same claim; "Quite generally, then, the implicate order has to be extended into a multidimensional reality...which is effectively infinite." (p. 189). *Bohm's implicate order corresponds quite closely to what I have called the Partimens* – a higher-dimensional realm of consciousness and mind.

Bohm explains his theory in less technical terms in a 1982 interview in the journal ReVision. He speaks of the 'deeper ground' that underlies both the explicate and implicate orders. When asked if this ground is self-aware, he replies, "Yes...since it contains both matter and mind, it would have in some sense to be aware." (1982: 37). Repeating again his view that "thought and matter have a great similarity of order", he goes on to state that "in a way, nature is alive, as Whitehead would say, all the way to the depths. And intelligent. Thus it is both mental and material, as we are." (p. 39).

Then in March of 1985, Bohm gave an important speech, titled "A new theory of the relationship of mind and matter", to the American Society for Psychical Research[8]. Its importance lay in his explicit endorsement of panpsychism combined with his first explicit usage of the concept of participation as related to new worldviews. Beginning with the panpsychist element, there are several passages where he makes clear his intention that mind is found in all systems that contain "information content", i.e. all dynamically coherent particles or subsystems. This new emphasis on 'information' recalls Bateson, but Bohm does not specifically cite him.

Recognizing that the term 'information' implies both 'meaning' and a consciousness able to perceive that meaning, Bohm notes first of all that his interpretation of quantum theory grants 'information' to all physical systems. On his view, "the notion of information [is] something that need not belong only to human consciousness, but that may indeed be present, in some sense, even in inanimate systems of atoms and electrons." (1986: 124-5). Because of the "basic similarity between the quantum behavior of a system...and the behavior of mind" (p. 130), he now sees that mind and matter are intimately connected at all levels of being:

> In our view...the mental and the material are two sides of one overall process... [T]here is one energy that is the basis of all reality. ... There is never any real division between mental and material sides at any stage of the overall process. (p. 129)

The conclusion is a pluralistic panpsychism that reaches both up and down the hierarchy of structure:

> I would suggest that both [mind and body] are essentially the same. ... That which we experience as mind...will in a natural way ultimately reach the level of the wavefunction and of the "dance" of the particles. There is no unbridgeable gap or barrier between any of these levels. ... It is implied that, in some sense, a rudimentary consciousness is present even at the level of particle physics. It would also be reasonable to suppose an indefinitely greater kind of consciousness that is universal and that pervades the entire process [of the universe]. (p. 131)

This panpsychism fits together for Bohm with a description of the world as *fundamentally participatory* in nature: "the basic notion is participation rather than interaction" (p. 113). In Bohm's vision, matter is participatory because of the quantum nature of atomic particles. These particles, even if assumed to be point-like entities (as Bohm does), are seen to exist probabilistically: an electron in an atom has a high chance of existing in its 'proper orbit', but has a non-zero chance of existing outside that orbit, across the room, or even across the universe. Because of this, every particle is in 'contact' with every other particle. Particles 'dance' together, to a greater or lesser degree. We can clearly see this phenomenon in special cases like superconductivity (wherein "electrons are thus *participating* in a common action based on a common pool of information" – p. 122), or in 'non-local' experiments. But this interconnection is always present. As he says, "the whole of the universe is in some way enfolded in everything and…each thing is enfolded in the whole" (p. 114).

Given this view of reality, the mechanistic sense of an observer dispassionately making an observation is fundamentally inadequate. Interaction becomes participation:

> [S]uch a complex process of participation evidently goes far beyond what is meant by a merely mechanical interaction. It is therefore not really correct to call what happens a measurement… Rather, it is a *mutual transformation* of both systems… (p. 124)

Each system changes the other – an idea reaching back to Hartshorne, Schiller, and even Campanella. Bohm concludes, like Wheeler, that

> The mechanical notion of an interactive universe is seen to be inadequate. It is in need of replacement by the notion of an objectively participative universe that includes our own participation as a special case. (p. 126).

In 1990 Bohm reissued this article with substantial changes (though, confusingly, under the same title). In the new version he clarifies his philosophical terminology without abandoning his central view. He states, for example, that "quantum theory...implies that the particles of physics have certain primitive mind-like qualities...(though of course, they do not have consciousness)." (1990: 272). He is clearly refining his ideas, no longer being satisfied to attribute "rudimentary consciousness" to elementary particles.

As well he strengthens his description of the interconnected, participatory nature of atomic particles. The quantum field, though dropping off exponentially with distance (like an ordinary field), retains in a sense its full efficacy. Associated with the decaying field is a 'quantum potential' that does not vary with distance. As Bohm says,

> The quantum potential depends only on the form, and not the intensity of the quantum field. Therefore even a very weak quantum field can strongly

> affect the particle. It is as if we had a water wave that could cause a cork to bob up with full energy, even far from the source of the wave. (1990: 276).

It is worth emphasizing: by 'far', Bohm means literally light-years apart, and instantaneously. This is a radically non-mechanistic interpretation -- a physical universe completely and instantaneously interconnected. Such a picture requires a new unifying concept, and Bohm has chosen to express it in terms of participation.

So for Bohm, participation occurs both within the 'material realm' (quantum physically), and also between the qualities of mind that occur at all levels of being. He describes "the essential mode of relationship of all these [levels of mind] as participation" (p. 284), a fact that bears on the human scale of existence as much as the atomic scale: "For the human being, all of this implies a thoroughgoing wholeness, in which mental and physical sides participate very closely in each other." (ibid). Bohm's ontology is thus best described, I claim, as a form of participatory panpsychism.

The last significant work by Bohm (co-written with B.J. Hiley) was the book Undivided Universe (1993). This is primarily a technical work in quantum physics, but it includes a well-developed philosophical analysis that elaborates on his earlier themes. The concept of participation continues to play an important role, and he often refers to "the irreducibly participatory nature of all quantum processes" (e.g. p. 284). He also refers here for the first time to Wheeler and his conception of the participatory universe. Bohm is in basic agreement, but feels that he has gone further in articulating that vision:

> We have proposed a model of such a reality in which we say, along with Wheeler, that the universe is essentially participatory in nature. However, unlike Wheeler, we have given an account of this participation...in agreement with the actual predictions of quantum theory. (p. 128)

The philosophical conclusions at the end of the book are taken largely verbatim from Bohm's (1990), and so do not add anything substantially new. Regardless, the further articulation of the quantum side of the participatory universe is a substantial accomplishment.

Seen jointly, the work of Bateson and Bohm constitute a culmination of the scientific perspective on participatory panpsychism. Bohm in particular articulated a technical basis for a new worldview, yet his domain was primarily that of quantum physics. With hylonoism I have attempted to flesh out a compatible view from within the domain of classical physics (in that nonlinear dynamics relies primarily on classical principles), and as it pertains to ordinary-scale events and structures. Bateson interprets information, Bohm interprets the quantum potential, and I interpret the point in phase space -- all panpsychistically, all participatorily. Furthermore I add the philosophical and historical dimensions that are lacking in both Bateson and Bohm.

4) Ubiquitous Matter and Zero-Point Energy

If the realm of matter and energy is fundamentally participatory, then it is reasonable to expect that matter is more than isolated and impenetrable lumps of stuff, and that energy is more than the motion of such lumps. A 'Partimater', if it is to be a useful and relevant concept, must demonstrate deep interconnectedness; it must be both holistic in some sense and yet account for the apparent discreteness of material things. And, such qualities should be evident to some degree in the realm of physics, even as viewed from within the Mechanistic Worldview.

One such quality is that of the literal interconnectedness of matter itself. Material particles, which were radically discrete in the Newtonian system, are seen in the light of quantum theory as being literally connected and 'in touch' with particles at arbitrarily large distances. This fact is important to Bohm, and plays a significant role in the overall vision of a participatory universe. There are at least three senses in which all matter is interconnected: particle fields, quantum potential, and zero-point energy. To situate this discussion, let me quickly examine the historical antecedents.
First, to clarify my terminology: 'ubiquitous matter' does not mean that all regions of the cosmos 'have matter', but more specifically, that any given subatomic particle has a

'presence' both where it is (classically) located, and also *at any point* in the universe; this is the conclusion of conventional quantum theory. If we accept that leptons (i.e. electrons) and quarks are the ultimate quantum particles, then a given particle – say, an electron in a drop of water – literally and physically exists not only in that drop, but in my hand, on the sun, or on the most distant star. We may say that the electron exists *manifestly* in the drop of water, and *subtly* at all other points in space.

The idea that a given piece of matter exists 'everywhere' goes back, like so many ideas, to ancient Greece. Anaxagoras believed that there were infinitely many elements, which existed together as One at the beginning of the cosmos. As Mind began the process of separation, it pulled apart the One into many distinct things, but could not fully isolate one element from another. The primordial intermixture of elements persisted even as the elements were pulled apart and fashioned into material objects: "as it was in the beginning, so now, all things are together" (frag. 6). As a result, each 'element' (i.e. distinct particle) is somehow present in each thing: "[I]n everything there must be everything. … [A]ll things contain a portion of everything." (ibid).

This idea lay dormant for several centuries until taken up by Bruno. In his holistic philosophy he envisioned a fundamental interconnection between each discrete 'part' and the unity of the cosmos. In his work *De immenso*, Bruno wrote, "the part hideth everywhere in the whole" (cited in Singer, 1950: 79). All parts are intimately interrelated, the web of relationships between parts merges with the whole. Bruno's *minima*, or monad (atom), possessed a soul, as I explained in my discussion of his panpsychism. This spiritual dimension to matter likewise existed throughout the cosmos, and represented the 'presence' of the monad: "Souls, like light or sound, are diffused in all directions through space; they do not impede one another but influence one another." (cited in ibid: 90). Bruno elaborates in *De magia*:

> [E]very soul and spirit hath a certain continuity with the spirit of the universe, so that it must be understood to exist and to be included not only there where it liveth and feeleth, but it is also by its essence and substance

> diffused throughout immensity... The power of each soul is itself somehow present afar in the universe...(cited in ibid)

Leibniz too accepted this idea, and made it a central feature of his ontology. Already in 1686 he observed that even arbitrarily small bodies influenced, and were influenced by, all parts of the universe. In the early work Primary Truths, Leibniz stated that the atom (he was not yet using the term 'monad'):

> is acted upon by everything else in the whole universe and receives some effect from everything... [N]ot only must there be effects produced in an atom from all the impressions of the universe, but also, in turn, the state of the whole universe must be inferred from the atom... (pp. 33-4).

This idea recurs in Principles of Nature and Grace, where he says that "everything is connected because of the plenitude [i.e. 'fullness'] of the world, [wherein] each body acts on every other body, more or less, in proportion to its distance..." (sec. 3). And we see it again in the Monadology:

> [E]verything is a plenum, which makes all matter interconnected. ... From this it follows that communication extends to any distance whatsoever. As a result, every body is affected by everything that happens in the universe... (sec. 61)

Like Bruno, the "power" of each monad is felt at any point in space, even if the particle itself is not present.

Not long afterward, Diderot pickup up on this evocative idea and worked it into one of his main themes. This idea first appears in the Interpretation of Nature, where Diderot notes that "we shall come to see that all phenomena, whether of weight, elasticity, attraction, magnetism, or electricity, are all merely aspects of a single state." (1754: 76). This is an intriguing anticipation of what we would today call a Grand Unified Theory of physics. Again this theme is elaborated upon in D'Alembert's Dream. Near the beginning he states that "everything is connected in nature" (1769: 54). Later he literally invents the notion of the 'web of life', by drawing analogy to a spider. The material web is seen as "a sensitive part of [the spider] itself" (ibid: 80); it is virtually an extension of his body. Diderot then makes the connection to the role of humanity in the universe. *Man is like the spider, and the cosmos is his web.* The characters of the dialogue ponder this insight:

> Mlle. de l'Espinasse: Why can I not know what is happening in...the world [i.e. the universe], since I am a group of sensitive points, pressing on everything and subject to impressions from everything?
>
> Bordeu: Because impressions grow weaker in proportion to the distance whence they come.
>
> Mlle. de l'Espinasse: If the lightest blow is struck at the end of a long beam, I hear that blow... If this beam stood touching the Earth with one end and [the star] Sirius with the other, the same effect would be produced. Why, since everything is connected, contiguous, so that *this beam exists in reality*, do I not hear what is happening in the vast space that surrounds me...?
>
> Bordeu: And who has told you that you don't hear it, more or less? (pp. 81-2; my italics)

To Diderot, the cosmic web is a matter of truth: all things are connected, and we do actually receive subtle sensations from all parts of the universe. Furthermore, the whole of 'sensitive matter' shares in this capability, and logically must also be receptive to actions throughout the universe.

This concept emerged in the realm of science in the mid-1800's, with the work of Michael Faraday. Faraday's experimental work with magnets led to early theories of electromagnetic fields. His field theories aligned him with the dynamism of Boscovich. In an important letter dated 1844[9] he notes that "the atoms of Boscovich appear to me to have a great advantage over the more usual [Newtonian] notion" (1839-55: 290). (Recall that in dynamism, atoms are 'immaterial', consisting of pure force). More importantly, he realized that such an atomic theory necessitates an 'ubiquitous atom'; the atomic force field (whether gravitational or electric) decays exponentially, dropping off rapidly but *never reaching zero*, even at vast distances. Faraday is the first scientist to explicitly acknowledge this fact:

> [T]he constitution of matter would seem to involve necessarily the conclusion that matter fills all space... [M]atter is not merely mutually penetrable, but each atom extends, so to say, throughout the whole of the solar system, yet always retaining its own centre of force. (ibid: 293)

Even in the first days of field theory, it was thus recognized that the influence of matter extends indefinitely. This force, of course, was extremely small, and could be conveniently ignored. Under conditions of crude experimentation and linear approximations, very small forces are seen to have no significance. Chaos theory suggests that we need to reconsider this presumption.

Whitehead absorbed these insights, and incorporated them with the Leibnizian idea of the mind as a "living mirror of the universe". In his Science and the Modern World (1925) he observes that we are aware of events distant in space and time; this awareness is reflected in our bodily experiences:

> In being aware of this bodily experience, we must thereby be aware of aspects of the whole spatio-temporal world as mirrored within the bodily life. ... [M]y theory involves the entire abandonment of the notion that simple location is...primary. ... In a certain sense, everything is everywhere at all times. (1925: 133)

Again, this conclusion logically follows from Faraday's idea of fields.

Whitehead wrote the above passage just as De Broglie was formulating the wave-nature of particles, and Schroedinger was developing the concept of the quantum wave equation. The wave equation gave new expression to the idea of ubiquitous matter. Not only were the particle fields ubiquitous, but so too the *particles themselves*. In quantum theory, a particle exists only in a participatory and probabilistic sense. *Participatory*, because the particle has no 'objective' location; its location is determined by the process of measurement. In a sense, the particle is *where you find it*. The act of observation in some way causes the particle to come into being, to become manifest. *Probabilistic*, because a particle has a high likelihood of being found in a particular location (say, in a given atom of hydrogen), but also has a nonzero likelihood of being found at any other point in space. Because of this phenomenon it is reasonable to say that the particle 'exists' everywhere, to a greater or lesser degree. Haldane noted this fact as early as 1934: "the De Broglie waves of any particle are supposed to be omnipresent" (1934: 89)[10].

Lastly, I note that even Teilhard de Chardin found significance in the idea of ubiquitous matter. He reiterates the point that all particles are present everywhere, both in terms of effect (force) and existence. He writes,

> [S]ince the atom is naturally co-extensive with the whole of the space in which it is situated...we are bound to admit that this immensity represents the sphere of action common to all atoms. The volume of each of them is the volume of the universe. (1959: 45)

This point is critical for Teilhard in explaining the deep unity of the cosmos.

As I mentioned above, Bohm is one of the few modern physicists to take seriously the idea of ubiquitous matter. He even strengthens the concept with his 'quantum potential' and the idea that the particle is fully efficacious at any distance.

Most recently, we can observe that chaos theory add impetus to both the fields and the quantum effects. Chaos theory informs us that *every action, no matter how small, has* *an effect.* This effect may be practically imperceptible to humans, but that does not deny its existence. And by the process of nonlinear feedback, the repercussions may be felt far more quickly and significantly than classical science would allow.

And so we are led to accept that all matter is literally interconnected. As Diderot said, "this beam exists in reality". As I move my hand, there is an effect in even the most distant stars. What precisely happens we cannot say; that *something* happens we are certain. And likewise the movements and actions of all parts of the cosmos affect us, in subtle and imperceptible ways. By simply knowing that there is this two-way interrelationship, this 'mutual transformation' of systems, we gain a vivid and sympathetic feel for the realm of the Partimater, and of the participatory cosmos.

* * * * *

There is yet one other important aspect to this picture of reality, one that also comes from within quantum theory. Theory tells us that energy is packaged discretely, in whole number multiples of a base quanta of energy based on Planck's constant (h). Originally this was presumed to mean that energy was either 'zero' (vacuum), or equal to the multiples: $1h\nu$, $2h\nu$, $3h\nu$, ... More generally, $E = nh\nu$. As the theory developed, it became clear that 'n' had to be shifted upward by a unit of ½; thus the correct formula became $E = (n+\frac{1}{2})h\nu$.

This apparently small change is far from trivial. It implies that the *vacuum state (n=0) actually has an 'energy' associated with it.* This is not the energy of some distant quantum potential, or passing fields; it is the energy of the vacuum itself. This is the so-called 'zero-point energy', or 'quantum vacuum'.

It might be suspected that the zero-point energy is very small. On the contrary – it is exceedingly large. Bohm was the first to recognize this, back in 1957. He observed that

> [I]f one computes the 'zero point' energy due to quantum-mechanical fluctuations in even one cubic centimeter of space, one comes out with something of the order of 10^{38} ergs, which is equal to that which would be liberated by the fission of about 10^{10} tons of uranium. (1957: 163-4)

This unimaginably vast reservoir of energy is present everywhere; it is inherent in the structure of space-time. And yet it is apparently inaccessible to us. Bohm explains, "Of course, this energy provides a constant background that is not available at our level under present conditions." (ibid). He speculates that it fuels the on-going universal 'process of becoming', and notes that in an evolving universe we may someday have more direct access to it.

This zero-point energy plays an important role in Bohm's Wholeness and the Implicate Order, as it forms the material basis for his concept of the 'holomovement'. He notes here that the magnitude of the zero-point energy "turns out to be very far beyond the total energy of all the matter in the known universe." (1980: 191). He proceeds to develop this imagery:

> What is implied by this proposal is that what we call empty space contains an immense background of energy, and that matter as we know it is a small, 'quantized' wavelike excitation on top of the background, rather like a tiny ripple on a vast sea. (ibid)

On this view, the entire cosmos of mass/energy is just the thinnest of veneers, supported by a vast depth of zero-point energy. I see an interesting comparison to the thin layer of life, the biosphere, that resides on and is supported by the vastly larger mass of the Earth. The Earth does not 'produce' the living sphere, but rather supports it and makes it possible by providing the raw materials and suitable environment. In a similar way it may perhaps be possible to say that the zero-point energy sustains the mass/energy cosmos.

Interestingly, Wheeler also noted the significance of the zero-point energy. For him it is an issue of critical importance: "No point is more central than this, that empty space is not empty. It is the seat of the most violent physics." (1974: 680). He compares this energy to that of the densest form of conventional energy, the nuclear particle (proton or neutron)[11], and notes that the zero-point energy density is about 10^{80} times higher. Unlike Bohm, Wheeler was unable to flesh out the philosophical implications.

Such an idea is almost incomprehensible within the standard Mechanistic Worldview. There is no standard sense of the term 'energy' that can be applied to a pure vacuum. Modern physicists are unsure of the role it plays. Most simply use it as the 'baseline' from which to measure other energies. Others ignore it. Generally speaking, they "simply do not know what to do with it"[12]. I would suggest that this is because it falls outside the bounds of the Mechanistic Worldview as presently conceived. It points toward the need for a new, encompassing worldview, one that is holistic, participatory, and subtle.

In fact it seems to point to an entirely new dimension of unitary reality[13]. If we allow that the realm of mass/energy (the Partimater) and the realm of mind (Partimens) constitute two distinct aspects of a monistic cosmos, then the zero-point energy may be considered as a *third essential aspect*, distinct from the other two. Bohm attempts to articulate something like this in his ideas of the “implicate order”, the “explicate order”, and the “holomovement” of zero-point energy that underlies both. The notion of such a ‘triple-aspect monism’ is radically new (historically speaking), and suggests that there may be more as yet undiscovered aspects to reality, perhaps infinitely many.

Finally, let me note that the zero-point energy has an interesting similarity to the ancient Stoic concept of the *pyr technicon*. Recall my earlier mention of the *pyr technicon* as the creative fire of the cosmos, the all-pervading force that forms and animates everything. Sandbach calls it "the god that makes the world" and "fire that is an artificer" (1975: 73). In the Epistles, Seneca refers to it as "creative reason" (in Long, 1974: 165). Inwood and Gerson translate it as "craftsmanlike fire" (1997: 138). There is a famous and beautiful passage referring to the *pyr technikon* from Diogenes Laertius, which Long translates as follows: "Nature is an *artistic fire* going on its way to create." (Long, 1974: 147). Cicero cites this same passage, informing us that this in fact was Zeno's definition of nature. It is unclear the extent to which zero-point energy can be said to 'create' material particles, but it certainly seems able to provide basis and support for the on-going existence of matter – and by extension, mind. In any case, we find yet again an instance of the ancient Greeks demonstrating prescient insight into the nature of reality.

For my purposes here, the zero-point energy is important because (A) it provides yet more evidence of a holistic and interconnected cosmos, (B) it may serve as a basis for interaction and exchange, particularly the instantaneous kind that occurs in the nonlocal action of the quantum potential, and (C) it can be seen as a kind of energy source for ordinary material reality, as that which sustains the elementary particles of mass and energy. For the remainder of this thesis I will treat the zero-point energy as a matter of fact, though the arguments do not stand or fall on this point.

NOTES:

[1] Recall my discussion of emergence at the end of Chapter 4.

[2] Coincidentally, scientists have discovered that the sun does in fact have an internal 'resonance phenomena' that is surprisingly complex. The sun exhibits at least two modes of resonance: (1) a 16-month cycle of increasing and decreasing rotation near the solar equator (cf. Howe, et al, 2000), and (2) a series of up and down surface vibrations, some 2000 km in magnitude, centered on a period of 5 minutes (cf. Friedman, 1986, or Lang, 1995). These 'solar heartbeats' point to an internal structure and complexity of a high order; and through the associated sun-spot activity they have a non-trivial effect on the Earth.

The sun has a number of other fascinating mysteries about it, not the least is the sudden and dramatic rise in the temperature of its atmosphere, from around 6,000 deg K at the surface to around 1,000,000 deg K at a height of 100,000 km above the surface; this astonishing increase has no known cause, and in fact appears to violate the 2nd law of thermodynamics. To attribute such complexities to the 'action of mind' is of course highly speculative. I would argue that the sun, like any dynamic system, possesses a noetic unity, and that (anticipating Chapter 8) this unity has an intensity that corresponds to its internal complexity. Furthermore, my theory of hylonoism actually would predict the presence of complex structure in the sun, or for that matter in any system in which an abundance of matter and energy interact dynamically – cf. my discussion in the following chapter.

[3] In fact a similar claim was made a year earlier by Walker (1970). His article primarily argues that quantum processes in the brain (at the synapses) account for a number of characteristics of consciousness, in particular its reality and non-physicality. At the end of the piece he observes that, more generally, "consciousness may be associated with all quantum mechanical processes" (p. 175). In his concluding paragraph, he states that "since everything that occurs is ultimately the result of one of more quantum mechanical events, the universe is 'inhabited' by an almost unlimited number of rather discrete conscious, usually nonthinking entities that are responsible for the detailed working of the universe." (p. 176).

[4] See for example Bateson (1972), pp. 403 ff.

[5] This aspect of Bateson's philosophy seems to have been generally unacknowledged. Recently, Chalmers (1996) has picked up on this Batesonian version of panpsychism (but without acknowledging it), and provided a more thorough philosophical elaboration. See Chalmers (1996: 293-301).

[6] He repeats this view in his Mind and Nature (1979). Here he writes: "I do not believe that single subatomic particles are 'minds' in my sense because I do believe that mental process is always a sequence of interactions *between* parts. The *explanation* of mental phenomena must always reside in the organization and interaction of multiple parts." (1979: 103).

[7] The six criteria are: "(1) All mind is an aggregate of interacting parts or components. (2) The interaction between parts of mind is triggered by difference. (3) Mental process requires collateral energy. (4) Mental process requires circular chains of determination. (5) In mental process, the effects of difference are to be regarded as transforms of the events which preceded them. (6) The description and classification of these processes of transformation disclose a hierarchy of logical types immanent in the phenomena." (1979: 102)

[8] The talk was published in 1986 – see Bohm (1986).

[9] "A speculation touching Electric Conduction and the Nature of Matter" (Vol. 2) – in Faraday (1839-55).

[10] Since Haldane equates the wave-nature with 'mind', he uses this fact of De Broglie's to argue for the view that mind, too, is omnipresent.

[11] Nuclear energy density is approximately 10^{14} g/cm^3, versus vacuum energy density of 10^{94} g/cm^3 (cited in Wheeler (1962) and in Weaver, 1987: 681).

[12] Larry Sklar, Professor of Philosophy, University of Michigan (USA), Feb. 15 1999 (personal communication).

[13] I wish not to overemphasize the role of the zero-point energy. It is still too unarticulated a concept to play much of a role in any metaphysical system. Some have attempted this (e.g. Zohar and Marshall, 2000), but the results to date are unconvincing.

Chapter 8 – Social Phenomena, Aggregate Mind, and the Nature of Exchange

To paraphrase George Herbert Mead: the capacity for 'sociality' is a universal characteristic of the natural world. To be social is to interact with one's 'companions', that is, with the forms and structures that exist in one's environment. I have argued that all material objects are interconnected and stand in a continuous relationship with one another; they co-participate in a common physical realm. Correspondingly, all minds are interconnected because they are joined to co-participating physical systems, and because of this they exist in the common realm of the Partimens. Every object participates to a greater or lesser degree in every other object, just as every mind participates in every other mind.

In the most basic sense, then, to socialize is to stand in relationship to the things in one's surroundings. To 'stand in relationship' is to interact, and in the physical world this means to engage in some kind of *exchange*. This exchange may be one of words, of money, of photons of light, or bits of food and water – in general, some form of mass or energy. Interaction, exchange, and co-participation are basic elements of all existence.

Living creatures socialize in a unique way, by interacting strongly with others of their kind. All life forms that reproduce sexually must of necessity socialize. Such living beings are born into social settings; they develop, mature, and reproduce in social settings. The nature of any given individual is intimately bound up with its social condition, and in a sense we cannot even define what it *means* to be an individual without a consideration of the social context. This seems particularly clear in the case of humans.

At the same time, living beings are themselves composites of living entities -- organs, cells, mitochondria, and so on. These elements interact and exchange energy, and by this process comprise the larger organism. Thus, livings things are literally 'participations', both from within (internally) and without (socially).

I have argued that the participations in the brain give rise to mind, and the larger network of participations within the body give rise to the 'total mind' of the organism. Hylonoism then generalizes this phenomenon, conjecturing that all participations between structures *at any level* give rise to mind. In the special case of living organisms, and humans in particular, the network of participations within a given species give rise to a special form of mind that may be called an 'aggregate mind'. (Traditionally, the human aggregate mind has been referred to as a 'group mind', or 'collective consciousness'). Such an aggregate mind is a necessary implication of hylonoism. It has particular importance for us as human beings, because of the power it has over both its constituent members (individual people) and the natural world in which it resides.

In this chapter I will explore the concept of an aggregate human mind, and then analyze its source in the phenomenon of social exchange; this leads to an outline of a general theory of participation. The human group mind is the best place to begin this exploration, first, because it is the most examined idea historically, thus giving us many developed ideas to draw from; second, because many aspects of our present social condition can be better understood in light of participatory theory of aggregate mind; and third, because it is symbolic of the concept of exchange in general that occurs throughout the natural world. I will rely on the work of Durkheim, since he was the first of the modern era to articulate a clear concept of group mind[1]. After Durkheim, Teilhard has perhaps done the most to develop the philosophical implications.

Group mind will be seen to co-exist with the various processes of exchange that occur in the human sphere. Thus, an understanding of mind requires an understanding of the phenomenon of exchange. In the most basic terms, exchange occurs when a person or thing gives up something of itself to another. Generally, the more of something one 'has' (money, food, energy), the more one is able to give. A network of exchange thus implies a condition of abundance or surplus – a surrender or expenditure of an 'excess'. The 'philosophy of exchange' as such was begun by Georg Simmel, and further developed in the work of Mauss, Bataille, and Teilhard. I will continue to explore this line of thinking, and reach some general conclusions about the connection between mind and 'participatory exchange'.

1) Historical Ideas of Group Mind

Human beings participate in the natural world. Our interactions with nature and natural objects are a continuous condition of our existence, and in fact are essential to our being. Certain subsets of these all-encompassing natural participations have relatively great significance for us. One of our more important modes of participation is amongst fellow human beings. This mode we simply call 'human society', as the term is commonly understood.

Much of our daily existence consists of interactions with other people, whether family members, coworkers, or anonymous strangers. If we consider both the time actually spent interacting and the time spent on things that are a direct consequence of social interaction, it is clear that such participation occupies a large percentage of our lives. Many of humanity's greatest accomplishments, and greatest failures, occurred through events that were shaped and conditioned by the nature of society.

In the context of this thesis, I want to explore the degree to which such socially-determined actions can be considered actions of a singular collective entity, possessing a unitary sense of mind. I am concerned less with the psychology of the *individual person*, and more with the psychology of the *group* as a whole -- though ultimately, both forms of mind are 'aggregate', and both may be seen to share certain core qualities.

Having thus examined something of the role of mind in the subatomic domain and in the human brain, I now consider the human social phenomenon and the possibility of an aggregate or 'group' mind. I have argued that the quality of mind occurs wherever interaction, exchange, and transformation take place; in short, *participation implies mind.* I claim that this is a general phenomenon, and occurs equally in the realm of social interaction and exchange as it does in cerebral neural exchanges. Social interaction yields mind, and society *is* mind.

The idea that some subset of humanity, or humanity as a whole, forms a 'group mind' is an old concept[2], and was held by a number of important thinkers. It dates back at least to Plato and his Republic. In his exposition of the ideal city (*polis*) Plato states that the city has a *psyche* (soul/mind) that is of the same nature and structure as a man. The human *psyche* has three parts: appetitive / consumptive, emotional / assertive, and intellectual / reasoning. Likewise the *psyche* of the city has three corresponding parts: economic, military, and governing. Plato writes: "we are surely compelled to agree that each of us has within himself the same parts [of the *psyche*] and characteristics as the city" (435e). And again: "the same number and the same kinds of classes as are in the city are also in the *psyche* of each individual" (441c).

Consequently a city assumes human-like personality characteristics. A city may be said to be "courageous" (429b), or have "good judgment" and be "really wise" (428d): "it necessarily follows that the individual is wise in the same way and in the same part of himself as the city" (441c). Both types of *psyche* relate to the Forms in the same way: "a just man won't differ at all from a just city in respect to the Form of justice; rather he'll be like the city" (435a). And more generally, the virtuous *psyche* (human or *polis*) must maintain a harmonious balance between the three parts; "everything...that has to do with virtue [is] the same in both" (441d).

The obvious question here is whether Plato is speaking merely metaphorically or if he intends to literally claim that a *polis* possesses a *psyche*. From within the mechanistic perspective one would obviously assume it is a metaphor, since there is no allowable sense in which a group of people can possess a *psyche*. However Plato writes as if he intends a literal interpretation, and nowhere does he indicate that this is a mere metaphor. Combined with the arguments for Plato's panpsychism (cf. Chapter 5), the literal interpretation is, I think, far more compelling.

Much later, Hobbes articulated his vision of the social creature, the Leviathan, which functioned as a coherent entity. In the mid-1800's Fechner argued for a collective consciousness of mankind. As James recounts it, "[Fechner says] we must suppose that my consciousness of myself and yours of yourself, although in their immediacy they keep separate and know nothing of each other, are yet known and used together in a higher consciousness, that of the human race..." (1909: 155).

The emergence of evolutionary theory gave new force to this view, and Spencer in particular became known for his ideas of social Darwinism and the society as an evolutionary competitor, in ruthless struggle with other social forms. Pierce's 1892 article "Man's glassy essence" clearly articulates a belief in the literal existence of a group mind. He extends his general conception of panpsychism and concludes that higher order minds must also exist. He writes,

> If this [panpsychism] be the case, there should be something like personal consciousness in bodies of men [collectively] who are in intimate and intensely sympathetic communion. ... *Esprit de corps*, national sentiment, sympathy, are no mere metaphors. None of us can fully realize what the minds of corporations [i.e. collectives of people] are, any more than one of my brain-cells can know what the whole brain is thinking. But the law of mind clearly points to the existence of such personalities... (1892: 21).

This is a clear and unambiguous statement, which follows logically from the theory of mind that Peirce has put forth. (I note again here that hylonoism's 'law of mind' also implies the presence of a group mind.)

Probably the most notable advocate of the group mind concept was Durkheim. His first major book, *Division du travail social* (The Division of Labor in Society, 1893), came out just one year after Pierce's seminal article. Durkheim believed that society formed what he called a *'conscience collective'*, or collective consciousness. This is a mental entity that is as real, distinct, and 'living' as the mind of an individual person. He defines it as follows:

> The totality of beliefs and sentiments common to average citizens of the same society forms a determinate system which has its own life; one may call it the *collective* or *common conscience* [i.e. consciousness]. No doubt, it has not a specific organ [but is] by definition, diffuse in every reach of society. Nevertheless, it has specific characteristics which make it a distinct reality. ... It is the psychical type of society... (1893: 79-80).

The collective consciousness was the result of a particular type of social unity that Durkheim called 'mechanical solidarity'. This he saw as a primitive form of unity. It occurred in cases where society was small, unsophisticated, and relatively homogeneous. The typical Australian aborigine tribe was a case in point. Individuals were relatively alike in skills and functions, each relatively self-sufficient. In such cases the collective consciousness was very strong, and provided a powerfully cohesive force.

As society evolved, Durkheim believed that a second unifying force came to prominence, and this he called 'organic solidarity'. Organic solidarity resulted from each person playing an increasingly differentiated and specialized function in society. Like the organs in a living body, people in more-evolved societies developed specialized roles that jointly supported the overall activity of the society. This, in fact, is the purpose and role of 'the division of labor': to allow for a more advanced, more specialized, more interdependent society to emerge. Durkheim does not seem to view organic solidarity as causing any kind of group mind.

So as society evolves the collective consciousness wanes, along with the influence of mechanical solidarity. Yet he claims that it never entirely disappears, even in modern (late 19th century) European civilization. It continues to manifest itself in a series of "social facts" that are the stable and consistent qualities of society, independent of any given individual. In fact, Caitlin observes that "[the collective consciousness] is, moreover, itself a composite of psycho-social facts" (1938: xiv). For Durkheim such facts included the relative constancy of statistics like crime and death rates. More generally, the social facts as qualities of the collective consciousness are able to exert a virtual force upon individual people. As he wrote in Rules of Sociological Method: "A social fact is to be recognized by the coercive power which it exercises...over individuals" (1895: 10). And: "[This force of constraint] is natural...because it springs directly from the collective being which is, itself, a being in its own right" (ibid: 124). These forces, or 'permanencies of social life', were seen by Durkheim as the activities of a real, living group mind. Caitlin notes that "indeed, it is true that Durkheim seems dangerously near personifying them and, by this animism, to endowing them with force." (1938: xvi).

Durkheim thus argues that restrictive social forces, though still present, are steadily decreasing along with the influence of the collective consciousness. Social cohesion is increasing, but now through division of labor and corresponding organic solidarity. This new force of cohesion is, he believes, more benign. Ultimately Durkheim sought an optimistic future for the human person, so he postulated that as the collective consciousness shrank, *the 'individual consciousness' grew.* The progression toward greater freedoms and human rights he took as evidence of this fact[3].

Discussions about collective consciousness were relatively common around the turn of the century[4]. Royce also believed in the group mind concept: "For the social order...is the very breath of life for me, the social being. Nor does it consist of mutually independent selves. It is an organism." (1899-1901: 183). William James concurred with Fechner, and asks suggestively, "May not you and I be confluent in a higher consciousness, and confluently active there, tho we now know it not? ... [W]e finite minds may simultaneously be co-conscious with one another in a super-human intelligence." (1909: 290, 292). I examined Haldane's panpsychism earlier, and he too is predisposed towards the idea. He notes that

> [T]he cooperation of humanity...may determine what Comte called a Great Being. ... [T]o my mind the teaching of science is very emphatic that such a Great Being may be a fact as real as the individual human consciousness... [E]verywhere ethical experience testifies to a super-individual reality of some kind. (1932: 113-4)

The physiologist R.W. Gerard argued for a biological basis of the social 'epiorganism'. He notes that the epiorganism "manifests the major characteristics of other organisms", including "dynamic equilibrium", "synthesis of living and non-living units", and "adaptive amplification" (1940: 405). Such a system "carries the connotations of volition and purpose" (p. 349), but the present state of human society constitutes only an "undeveloped mind" (p. 407).

Most panpsychists prescribe to some form of group mind concept, but not all. Hartshorne is a notable case in point. For reasons that are less than compelling, he believes that "there are no good indications that human groups are organisms which could think and feel as individuals." (1942b: 128). Even so, he grants that "there is some hidden truth in the group mind concept" (ibid) – he makes allowances for a world-soul[5]. More recently Rene Thom has made a similar observation from the standpoint of 'catastrophe theory', a variant of chaos theory. He wrote:

> [W]e might ask whether a social group acquires a 'mind' that could have an autonomous existence. It seems that the social mind [i.e. group mind] has a fragmentary character very similar to that of the animal mind. (1975: 319-20)

It is interesting that Thom's analysis of structure using concepts of chaos led him to likewise see the presence of mind in the social phenomenon, though he did not develop this idea at all.

Probably no thinker has developed the philosophical implications of the group mind more than Teilhard. His Phenomenon of Man lays out a clear and cohesive picture of humanity as a threshold point in the universal evolution of mind. The human as an individual, emerging some million years ago, was a watershed development because he had the capacity for reflective thought, i.e. he 'knows that he knows'. Now the development of human society constitutes the next great phase of "hominisation", and like the first phase it too is an emergence of new psychic qualities:

> [T]here is really developing above us another hominisation, a collective one of the whole species, [and] it is quite natural to observe, parallel with the socialization of humanity, the same...psycho-biological properties rising upwards on the earth that the individual step to reflection originally produced. (1959: 306)

This second phase of hominisation is to be conceived of as the "spirit of the earth", the central element of the mind of a sentient planet. "We are faced with a harmonized collectivity of consciousnesses equivalent to a sort of super-consciousness." (p. 251).

It is enlightening to examine Teilhard's theory of how this process of hominisation comes about, especially in the second phase of human society. Rather than simply describe it as the next logical step in universal evolution, he points to a specific phenomenon that drives this process forward. This phenomenon he calls 'super-abundance'; it is the subject of my next two sections.

2) Social Mind as a System of Exchange

Early in this thesis I noted that participation, conceived as a process of exchange, is a universal phenomenon. Furthermore I argued that exchange coexists with mind. Thus the theory of hylonoism is conceived as a participatory theory of mind. It was founded on the energy exchange within the human brain. I claimed that the stable system of exchange allowed us to view the brain as a cohesive, relatively intense feedback system definable in terms of the hylon moving in phase space, within the bounds of a stable quasi-attractor. The 'society of neurons' results in a unitary experience of mind, because it is a relatively stable and relatively intense system of energy exchange between like structures. Each structure, each neuron, gives something of itself (i.e. some bit of energy contained within it), receives energy from other structures, and incorporates this energy into itself.

As a general phenomenon, I claim that it can be found in all situations that are 'social' in the broadest sense. A society of neurons yields mind, and so in a like fashion does a society of people, a society of plants, or a society of atoms. Any aggregate or collection of interacting structures may be termed a 'society'. Any such society is based in a process of exchange, as I explain below. Exchange is the basis of society, and following hylonoism, this system of exchange must result in a generalized kind of 'group mind' that I will call *social mind*[6]. In what follows I will be addressing the particular case of human society, but the general principles, I claim, hold universally.

In the latter part of the 19th century, Georg Simmel was perhaps the first to recognize the fact that exchange is the basis of human society, and that this notion is of central importance. Simmel is considered one of the founders of modern sociology (along with Durkheim), but his most important book, The Philosophy of Money (1900/1907), examined the philosophical nature of 'pure exchange'.

A number of his points are important to this discussion. First is his basic observation that society is fundamentally 'interaction between people'. Social interaction has a specific structure, namely, that of *exchange*: "[R]elationships between people can be interpreted as forms of exchange... Every interaction has to be regarded as an exchange." (p. 82) -- where 'exchange' is understood to mean a two-way action or effect. This is a completely general statement. It applies in all social situations, whether the interaction is one of feelings, ideas, or economic goods. As he says, "every conversation, every affection, every game, every glance at another person" (ibid) must be regarded as exchanges.

A question naturally arises (which Simmel does not address) regarding the nature of *that which is exchanged.* In the physical realm this can only be either a form of *matter ('goods')* or a form of *energy ('services').* More generally we can say that *the objects of exchange are forms of mass/energy*, or, following the energeticist interpretation of Einstein, Russell, and Popper, simply forms of energy in its most general sense. Even purely monetary exchanges are of this nature, as they involve either the physical exchange of paper or metal, or of energy in the form of information that signifies these. All exchanges involve exchanges of energy.

I will distinguish three categories of exchange: (1) voluntary economic, (2) voluntary non-economic, and (3) autonomic. The first two of these Simmel discusses, and the third is my addition. The first category consists of the usual type of business exchange, i.e. goods/services for goods/services (barter) or goods/services for money (purchase) -- in any case, one form of energy for another. Second, voluntary non-economic exchanges involve non-economic entities: A person speaking to another sends sound energy. If a word comes to his mind, and he translates it through effort into sound, this sound is received and decoded by all who hear it and the same (or similar) meaning recovers. Simple acts, like giving a book to someone, or throwing a ball, constitute exchanges of mass/energy that carry no economic implications. Even a touch of the hand – or slap in the face – constitute basic non-economic exchanges.

Third is the class of exchanges that I call *autonomic*. These are the involuntary exchanges that occur without effort per se, but result in a loss of 'personal energy' (to use Simmel's phrase) nonetheless. The human body is continuously giving off material, ranging from carbon dioxide to water vapor, to flecks of dried skin, to body odor, to waste products. All these things are exchanges with the surrounding environment, and they mark our presence. We continuously emit not only matter but also photons of light, of varying energies. For example, consider the visual image of a person as it appears to the naked eye. Light energy is emitted by the atoms of the skin, hair, clothes, etc, and reaches the eye of the recipient. This is, in a very concrete sense, a transfer of energy. Granted that this light originated elsewhere (say, the sun), but that is a different exchange. Light is absorbed by the skin, integrated into the person's 'personal energy', and then partially re-emitted at different frequencies, to become received by some viewing eye, and hence part of a new exchange. And it is not just visible light. The human body is always radiating heat energy in the form of infrared photons (electromagnetic field) and gravitons (gravitational field), and perhaps of other fundamental forces as well.

As with sound, the 'meaning' in the pattern of photons arriving at the eye, or the pattern of tactile forces from a touch, is a function of both the energy itself and the context in which it is received. Because of our common physiology and worldview, we attribute a common meaning to these various forms of mass/energy. Meaning is found both in the *form* of energy exchanged, and in the *context* in which that exchange occurs. But here I want to focus not on the meaning itself but rather nature of the energy exchange, because 'meaning' is more of an individual phenomenon; it relates to the effect on the person. I prefer to explore the exchanges between people, as this is the process that co-exists with the social mind.

So to paraphrase and expand on Simmel's insight: *all interaction is the exchange of energy.*

From the above, it should be clear that there are *two forms of energy* 'expended' in any exchange: the (mass/)energy of the object exchanged, and the personal energy involved on behalf of each participant. Simmel emphasizes the importance of this latter component: "it is always personal energy...that is involved in interaction" (p. 82). In the case of voluntary exchanges, this personal energy takes the form of effort or work, e.g. muscle power. For an involuntary, autonomic exchange, it may be more subtle, like the heat given off by the skin.

There is a further articulation that can be made on the nature of exchange. The ordinary situation is when two different goods/services are exchanged for each other, as in a loaf of bread for a dozen eggs, or one dollar for a bag of flour. But there is a special case of exchange in which *only one party gives*: this is the '*gift*'. The folk notion of a gift is something given without exchange, benefit, or even effect, to the giver. More specifically we may say that a gift involves the transfer of something or some object that one possesses – i.e. strongly participates with – to some other person or being. A somewhat more philosophical notion of the gift may be: *something given 'of oneself' to another.*

However, I argue (following and expanding upon Mauss – see below) that there is no such thing as a true gift. A one-sided transfer of goods always results, at least, in an *effect upon the giver* -- even though this return action may not be in the form of goods or services.

There are at least three senses in which the giver is affected by the gift: first, in the satisfaction the giver receives in giving; second, in that the giver has undergone some kind of loss; and third, in that the giver may receive some future effect based on actions of the recipient. Such giving may be voluntary (economic or non-economic) or autonomic. When given voluntarily, there is expectation of gain; when given autonomically, there is an 'implicit expectation' of reciprocity. Simmel mentions the gift in passing, but does not attempt to make clear these effects.

With the notion of the gift in hand, I make one further observation on exchange: it may also be construed as a *sequence of two 'one-sided gifts'*[7]. In ordinary economic exchanges, the initial gift carries with it the immediate obligation for a specific reciprocated gift. I give the grocer a gift of one dollar, and he reciprocates with a gift of a loaf of bread. The initial gift carries with it an obligation, and the reciprocating gift carries the closure of obligation. The reciprocated gift may happen more or less immediately, as when purchasing something with cash, or it may be delayed by some amount of time.

Viewing exchange as a sequence of two one-sided gifts is helpful because it emphasizes the *element of loss*. Every act of giving represents the surrender of something. It requires effort, expenditure, loss — generally, *sacrifice*. To purchase a loaf of bread, I must surrender some of my money. To speak to someone, I must exert myself physically and mentally, and consume a small piece of my bodily energy. The gift thus appears initially as a pure loss, as the giver sacrifices something 'of himself'. Granted, it may be a material loss, but as I have explained, this loss is offset by at least three degrees of effect upon the giver. The element of sacrifice is central to every exchange, and hence every interaction.

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In Simmel's view, interaction is motivated by desire. People interact because they want or need something -- a loaf of bread, cash, security, knowledge, love. Given that people act of their own 'volition', they seek to ameliorate their desires through exchanges.

More generally, we might say that people act in their own (perceived) best interests, and essentially seek to maintain or enhance their overall well-being. This is true not only for humans; all forms of life act in this way, even if we are unwilling, say, to ascribe freedom of will to a plant. All life, when unimpeded, acts to enhance its own well-being.

The act of exchange can thus be described as a sacrifice of something in order to gain something else: something of *greater value.* Simmel informs us that people interact, and thus exchange, for a specific reason: *to increase their quantity of value.* I sacrifice money for bread because the bread has greater value to me than the money spent. I expend some amount of effort, money, energy to travel to visit a relative because it makes me feel better, both for my own sake and because I enjoy the pleasure of my relative. The desire for increasing personal value drives social interaction.

Note that *on this view, there is no such thing as altruism* — if altruism is to be conventionally defined as accepting personal loss for the benefit of others with no compensation[8]. Any action for another is undertaken *because I gain value*[9], even if this gain is only pleasure in seeing another prosper. Such a view is more complex than 'enlightened self-interest' (which seeks maximal personal gain while allowing others to benefit), because one significant source of 'gain' is the very pleasure and satisfaction of others, i.e. it accepts non-material gains as much as material ones. So it may be called egoistic, but only in a very limited sense.

So I exchange money for goods (e.g. cash for bread) because I realize a gain in value. Simmel recognized the inherent reciprocity in this situation. The same holds of course for the baker: the money to him is of more value than the loaf of bread (because he has a relative bread surplus). This leads to an important conclusion: *every 'voluntary' exchange increases the total value for both parties.* What this means is that value is a non-zero entity; it may, and in fact always does, increase bilaterally in all willing exchanges. As Simmel says, "It is the object of exchange to increase the sum of value; each party offers to the other more than he possessed before." (p. 82). *Exchange yields a net increase in value.* He saw exchange as 'producing' value in the same sense of the production of an economic good: "exchange is just as productive and value-creating as is production itself." (p. 84).

This is a somewhat surprising and paradoxical outcome. The normal perception of exchange is one of *equality*, of a 'fair trade', of both sides getting an item of equivalent value -- by definition. There is of course a kind of equality in such exchange, in that one loaf of bread 'equals' (say) one dollar. But this overlooks the point that the bread is *more valuable* to the purchaser, and the dollar *more valuable* to the baker, than previously. Value is produced *ex nihilo*; it is a non-conservative quantity.

So the common view of an equal exchange is not true with respect to value. But even this common view, which underestimates the effect of value increase, is seen as overly optimistic from the scientific standpoint. Science tells us that in all exchanges *something is lost*, due to entropic and frictional forces that dissipate energy. Any physical system in which energy is exchanged or transformed will gradually lose usable energy, in the form of heat -- this I take as true. So all exchanges must, physically, result in a *net loss* of energy. And yet in the social sphere they result in a *net gain* in value. So the energy lost in the exchange seems to go in part to entropic heat loss, but also in part as a conversion into value gain. In a voluntary economic transaction, we may presume that *exchange converts energy into value.*

There is another related argument for this conjecture that energy is convertible into value. Recognize that in an economic system, which is the exchange of goods and services, *goods are matter* and *services are energy*. Matter and energy are convertible, and more generally defined as manifestations of the single entity mass/energy. Goods and services are unified, economically, in the concept of *money*. Simmel observes that "money represents pure interaction [i.e. exchange] in its purest form" (p. 129). As a result, he argues that money in turn is pure value. He says, "[money is] the incarnation and purest expression of the concept of economic value" (p. 101); and, it is the "purest expression and embodiment" of "the value of things" (p. 119). Goods and services are unified in the concept of value, and mass and energy are unified in the concept of mass/energy, which is physically describable simply in terms of energy itself. So we achieve a parallel reduction, wherein the initial equation of goods to matter and services to energy results in the equation of energy (generally) with value.

In one sense, this equation of energy with value is simply a recognition of the basic physical facts that (A) all things 'are' energy, and (B) all dynamic living systems dissipate energy and hence need a continuous infusion of energy to sustain their being. Energy, in various forms, is of the deepest inherent value to life. We should thus expect a connection between our units of exchange and the basic units of energy. Beyond this, higher order structures are 'built' out of lower order ones via exchanges of energy. The social organism 'values' energy because it is an essential part of its being, and it serves as the physical basis for the social mind.

Of course, not all social exchanges are beneficial. The above pertains only to 'voluntary' exchange, to that which increases individual well-being. Certain involuntary or unwanted exchanges can produce negative value. A punch in the face is a kind of exchange, and one that is probably not beneficial to the recipient; but it is received involuntarily, and hence not in one's best interest. (Unless I am in a prize fight, and accept the punches in exchange for pay). Nor is all this to say that an exchange that seems beneficial at the moment cannot turn out later to be bad. The very notion of 'voluntary exchange' presupposes that one receives (and gives) what one believes. I may buy an apple only to find it rotten inside; my initial value gain turns out to be a loss, but then the voluntary exchange turns out in fact to have been effectively involuntary.

This much must suffice as an outline and elaboration of Simmel's theory of exchange. Society fundamentally is interaction, where all interaction is an exchange of energy. Exchange involves reciprocal acts of 'gifts', of transfers of energy from giver to recipient. Additionally, there is the 'personal energy' expended on the part of each participant. So to deliver a gift requires two aspects of energy expenditure or loss: the mass/energy of the gift, and the personal, bodily energy expended. This act of giving may be voluntary, or autonomic.

The loss experienced represents a sacrifice. This sacrifice, when voluntary, results in a net increase in value. The increase in value comes from the energy sacrificed, which is partially converted into value and partially lost (sacrificed!) to the environment.

If I may speak of the metaphysics of exchange, I note that the sacrifice of energy for gain in value is *literally a sacred process*. To 'sacrifice' something is to literally 'make sacred' that thing (*sacrificium*, from *sacer* + *ficium*). From the standpoint of society, sacrifice to gain value is a reverential act. It not only confers gain upon the participant; it also literally *brings society into a more intense form of being*. The background social system into which we are all born has always existed, as long as humans have. But the process of sacrifice and exchange intensifies the social being, intensifies the social mind, and gives it greater power in the world.

This is why I have gone into a lengthy discussion of exchange. It is the process by which society becomes more fully realized. The exchange of energy in various forms serves to strengthen the pre-existing participatory bonds, and knit together individuals into a relatively cohesive whole. The more strongly people interact and exchange, the more intensely does the social organization and social mind exist[10].

This system of social exchange is, in at least one important sense, not unlike all other systems of physical exchange, whether in a crystal, a human brain, or a galaxy: it can be described in terms of a vast-dimensional phase space. The 'state' of any social system is representable by a single point, a *social hylon,* and the evolution of that society by a trajectory through phase space. Following the suggestion of hylonoism, this point constitutes a 'unity of social mind'. And the dynamics of the exchange, governed by nonlinear factors, is necessarily chaotic -- and describable as a virtual attractor. The overall pattern of the social attractor, developed over time, may be considered the 'personality' or character of the given social group.

How one might represent this space in practical terms is a hugely complex problem, but one with which I believe we need not be concerned. Whether we focus on the 'information' exchanged (in the form of written or spoken language), *or* on the economic system (in the form of goods and services), *or* on the quantum state of every particle in the system, is perhaps irrelevant. Each particular representation would give us one perspective on the unitary being of the social organism, and one perspective on its unity of mind.

What is important, though, is that we realize that the social system and the social hylon necessarily requires an accounting of *that which is exchanged.* The matter and energy moving between individuals is an inherent part of the social being. We can envision, for example, a phase space for people separated by vast distances, who exchange nothing at all in ordinary economic or communicative terms[11]. But this 'social system', though it exists, is of such low intensity that it pales with respect to the more intense forms of social being. Degree of participation determines degree of being. Society co-exists with the processes of interaction and participation, and the forms of exchange determine much about its power and intensity.

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Simmel only touched upon the idea of the gift. In 1925, Marcel Mauss made it the central theme of his book *Essai sur le Don* (The Gift). Mauss was primarily a sociologist and anthropologist, but like Simmel he addressed philosophical concepts as they pertained to his area of expertise. Mauss, like Levy-Bruhl, studied 'primitive' cultures for clues about the general nature of human society. In the concept of the gift Mauss found not merely some special case of exchange, but the very basis of primitive society. He argues that the gift is the primary means for circulation of goods in such societies, and draws all members into a system of reciprocating obligations. The gift system acts as a central force of social cohesion; numerous social norms and customs are shown to have evolved around it. Mauss was among the first anthropologists to demonstrate the important social role played by the 'economics' of gift exchange.

Mauss argued, as I have above, that the system of gift exchange is the core of the social structure. Though he does not cite Simmel, Mauss reaches a similar conclusion -- that exchange brings society into being. Writing in the Foreword to the 1990 English translation of The Gift, Douglas explains Mauss' view:

> [E]ach gift is part of a system of reciprocity in which the honor of giver and recipient are engaged. It is a total system in that every item of status or of spiritual or material possession is implicated for everyone in the whole community. ... The whole society can be described by the catalogue of transfers that map all the obligations between its members. *The cycling system is the society*. (1990: viii-ix; my italics)

This recalls my description of the social hylon as the instantaneous state of the system of exchange, which takes on characteristics of mind.

The notion of mind or spirit is central to the gift. In this sense Mauss develops an almost animistic interpretation of exchange. He observes that the gift has the power to compel reciprocity precisely because it becomes *ensouled* in the process of giving. This soul or spirit of the object has some essential connection to the giver, and so the recipient is bound to return the gift and thus placate the spirit that he has acquired. In his examination of the Maori society, Mauss notes this fact:

> What imposes obligation in the present [i.e. gift] received and exchanged, is the fact that the thing received is not inactive. Even when it has been abandoned by the giver, it still possesses something of him. ... This is because the *taonga* [gift] is animated by the *hau* [spirit] of…its native heath and soil. (1925/1990: 12)

Mauss goes on to describe this process in terms sounding very much like participatory panpsychism:

> [I]n Maori law, the legal tie, a tie occurring through things, is one between souls, because the thing itself possesses a soul, is of the soul. Hence it follows that to make a gift of something is to make a present of some part of

> oneself. … [T]o accept something from somebody is to accept some part of his spiritual essence, of his soul. (ibid)

A bit later he notes that all objects in the human sphere, not just those exchanged, are considered animated. Speaking of the native dwellings, he says: "The houses, the beams, and the decorated walls are also beings. Everything speaks…" (p. 44). More generally, "Things possess a personality, and the personalities are in some way the permanent things of the clan." (p. 46). But ultimately it is the spirit of the things exchanged that has the greatest effect upon the society: "Souls are mixed with things; things with souls. … This is precisely what contract and exchange are." (p. 20).

As Simmel noted, exchange produces a *surplus of value*, an abundance that bestows well-being upon society. Mauss observes the same: "The exchange of presents between men…incite the spirits of the dead, the gods, things, animals, and nature to be 'generous towards them'. The explanation is given that the exchange of gifts produces an abundance of riches." (p. 14). Objects and wealth are actually seen to 'desire' exchange, as they are believed to know that it is beneficial. "The land, the food, and all that one gives are…living creatures with whom one enters into a dialogue, and who share in the contract. They seek to be given away." (p. 56). Mauss mentions the idea of exchange yielding abundance only in passing; a thorough examination comes later with Bataille and Teilhard.

Mauss concludes The Gift with an ethical analysis of his present-day society. He decries the concentration of wealth and the hoarding of riches. He argues that the primitive form of social interaction had many benefits, primarily that it resulted in greater equity and justice. Society must restrict individual accumulation of wealth; it must "find a way to limit the rewards of speculation and interest." (p. 69). The wealthy must retake a sense of responsibility for society: "the rich must come back to considering themselves…as the financial guardians of their fellow citizens." (ibid). The return to at least some aspects of primitive society is a great imperative: "Thus we can and must return to archaic society and to elements in it." (ibid). Here Mauss implicitly endorses a move toward a participatory, panpsychic social order.

3) Bataille and the Concept of Superabundance

Teilhard, as I explained, saw the growth of intensity of the social mind as deeply connected with a phenomenon he called 'superabundance'. This is an intriguing philosophical concept that has not received much attention, as its importance has been significantly overlooked.

The idea seems to have begun with the Neoplatonists of the early Christian era. In combining Platonic concepts with a virtually monotheistic emphasis on "the One", they began to believe that this ultimate Goodness, or God, must put forth a tremendous outpouring of beneficence and energy to sustain the order of the cosmos. One of the earliest usages of the term came from Iamblichus. He wrote: "The divinities of the highest order have always a superabundance of power, and while it is superior to all, it is at the same time present with them all equally without impediment." (ca. 290/1989: 119; Wilder translation). Gregory of Nyssa refers to the same idea though without using the exact term. His theory of *epectasis* or perpetual growth of the soul leads to the notion of a feedback process (as explained in Chapter 5) resulting in a superabundant outpouring of goodness: "everything that flows in produces an increase in capacity...and the nourishing Source keeps overflowing as the increased store of goods becomes ever greater." (ca. 375/1961: 63). God is clearly seen as a limitless source of goodness, and this superabundance is capable of being participated by the pious mortal.

Pseudo-Dionysius, though, makes the most use of the concept. His articulation of the qualities of God in the Divine Names frequently employs the term, making it a central theme of his vision. In Chapter 2 of that work he refers to the "generous emanation of the absolute divine unity which, superabundant with goodness, overflows into a multiplicity" (in O'Rourke, 1992: 13). Here is a new application of the same idea: that superabundant goodness is the reason for the creation of the Many out of the One. (This was a major philosophical problem for the Neoplatonists – how to account for the apparent multiplicity and variability of things if all are One?). Later in the same chapter Dionysius comments: "[God] is abundance where there is want and superabundance where there is plenty." (ca. 500/1987: 66).

References continue throughout Divine Names:

> Given that the Good transcends everything, as indeed it does, its nature, unconfined by form, is the creator of all form. ... It is not *a* life, but is, rather, superabundant Life. It is not *a* mind, but is superabundant Wisdom. (ibid: 73)

Elsewhere he refers to the Good as "superabundant source in itself of the beauty of every beautiful thing" (ibid: 77), and observes that the Good "loves all things in the superabundance of his goodness" (ibid: 79). As the ultimate Good and ultimate cause of all existence, God's power is unlimited: "[God] is Power insofar as he exceeds all power. He is the cause of all power. ... He possesses a superabundance of power" (ibid: 111). Dionysius thus argues that superabundant 'goodness' is manifest in the physical world as a superabundant power, another new articulation. Finally, we see references in his other works to God as a "superabundant light" – cf. Mystical Theology (in O'Rourke, op cit: 12), Celestial Hierarchy (in 1987: 174), and Ecclesiastical Hierarchy (ibid: 223).

The concept of superabundance then seems to have lain dormant until it was taken up by Nietzsche. Among Nietzsche's furious last writings of 1887-88, immediately after Beyond Good and Evil (1886), were the entries that were posthumously published as The Will to Power. Here one finds a scattering of themes centering on '*Der Wille zur Macht*' ("will to power") and, more generally, the 'revaluation of values'. References to exuberance and surplus appear throughout, and they are among the central themes. A few passages refer explicitly to *ueberschuessigheit*, or 'superabundance'[12]. For example: "Superabundant force in *spirituality*, setting *itself* new goals" (note #687, 1967: 366). Elsewhere Nietzsche recalls Iamblichus' and Dionysius' references to superabundant power:

> [T]he essence of "pleasure" has been correctly described as a feeling of more power... [Regarding the sequence of 'resistance' and 'overcoming'], this game of resistance and victory arouses most strongly that general

> feeling of superabundant, excessive power that constitutes the essence of pleasure. (note #699, ibid: 371)

Nietzsche employed but did not emphasize this particular term, yet it seems to embody one of his more important general concepts – that of an overflowing abundance leading to greatness.

Georges Bataille was fascinated with Nietzsche, read him extensively, and quoted frequently from Will to Power (cf. his book On Nietzsche, 1945). Though he does not credit Nietzsche (or the Neoplatonists), it seems very likely that he appropriated the idea and then developed it into a key element of his philosophical system. As such, Bataille is the only philosopher prior to Teilhard to discuss in detail the notion of superabundance and its philosophical importance.

Bataille was also clearly aware of the work of Mauss. Eight years after The Gift, Bataille wrote one of his first important philosophical essays, "On the notion of expenditure" (1933). He focuses here primarily *on the social surplus, and how it is spent.* Drawing on Mauss, he begins to lay out his ideas regarding the economic surplus generated in the modern Western economy. Bataille accepts Mauss' contention that the system of exchange plays an essential role in determining the nature of society, and that exchange results in an economic abundance. He differs from Mauss in that he sees the gift as representative of this very surplus, rather than as the basis for a system of exchange.

For Bataille, social exchange produces wealth. This wealth must be accounted for in one of three ways: (1) it can be 'saved' (only to be spent later); (2) it can be spent on productive, 'useful' endeavors, such as manufacturing, food production, purchase of clothing or shelter, and so on; or (3) it can be spent on 'unproductive' items, like luxuries, arts, sports, 'sumptuary monuments', etc. In the 1933 essay Bataille focuses on this third category, as he sees in it the true meaning of 'expenditure', i.e. the sacrifice of the social surplus. The manner in which this surplus is spent characterizes the core of a given society.

This is important because *the surplus of wealth (money or value, or both) is what allows society to develop and grow*. Society develops its most articulate forms and sensitivities through the abundance produced by exchange. Heights of culture, art, philosophy, and music all tended to occur historically in societies that were able to produce an abundance of wealth. A surplus of money and value traditionally allowed certain aspects of human culture to flourish, and for very straightforward reasons: money supported a leisure, artisan, and intellectual class of people who were freed to concentrate on the more refined aspects of civilization.

But this abundance, and the modern cultural benefits that follow, only comes when wealth is circulated and exchanged. On this point Bataille is highly critical of modern society. In his view it deploys its wealth primarily in the first two ways (above), and neglects the sumptuary unproductive expenditure that results in the benign dispersion of excess energy and the true flourishing of culture[13]. "Today the great and free forms of unproductive expenditure have disappeared. ... Everything that was generous, orgiastic, and excessive has disappeared" (1933: 124). The wealthy have neglected their "obligation" to freely circulate their money, something that results in the higher good of an elevated society; as it happens, "In so-called civilized societies, the fundamental obligation of wealth disappeared only in a fairly recent period." (ibid: 123). Wealth today, he says, is exchanged either for the purposes of sheer acquisition, or in order to produce yet more wealth (which has important implications, as I will explain).

Wealth had turned away from the glory of individual human achievement, and toward something new: the *glorification of social achievement.* This was a long and gradual process, and it was not until the 1930's and 40's that thinkers like Bataille could clearly observe what was happening. Intellectuals at that point began to realize that the surplus – the abundance of wealth – furthered social evolution, and that the use of that surplus was the best indicator of the nature and evolutionary status of society.

Bataille's emphasis shifted from expenditure to surplus and abundance in the mid-1940's, resulting in one of his most important books, *La part maudite* (The Accursed

Share)[14]. The 'share' of this title is the social surplus of value/wealth, which must ultimately be expended, willingly or unwillingly. Bataille sees this surplus, as I do, as consisting essentially of *energy*. As such, the storage and confinement of this energy is dangerous. If not circulated and relieved of its pressure this energy threatens to explode within the society in a violent and unpredictable manner – as for example in military aggression (cf. contemporary United States), economic upheavals, *decadent* expressions of luxury (ones that serve no higher purpose), social dislocation, etc. The best way to avoid this danger is to maintain a freely moving and equitable system of exchange, including regular expenditures on 'non-productive' activities that can both drain off the dangerous excess and at the same time allow for a flourishing of both individuals and society.

Bataille then took his analysis one level deeper. He sought the source of the surplus in human society. Simmel argued that this was in the very nature of exchange, a point Bataille seems to have understood even though he did not cite Simmel. In fact, Bataille observed that pure human-to-human exchange could not alone account for wealth and surplus. Humans fundamentally interact and participate with *nature*, and this he saw as the true source of social exuberance.

Simmel also realized this point. He comments that exchange occurs not only in the human-to-human realm but also in the larger natural realm. Human-nature exchanges occur all the time, beginning with the air we breathe, and the food and light energy that we take into ourselves. As society evolves our forms of participation with nature evolve – as when a farmer raises a crop, or a miner extracts minerals. In these cases the human expenditure, or sacrifice, is *labor* ("all labor is undeniably a sacrifice" (1900/1907: 85). The miner exchanges his labor (energy) for the material (mass) of the Earth. The miner does this 'willingly', the Earth 'unwillingly'. As a result, the miner gains in value, and the Earth decreases in value because the ecosystem is disrupted and natural systems of exchange are disturbed. Whether there is an overall net increase or net decrease, we cannot say, because these values are of a fundamentally different order.

Bataille took this idea and developed it into the starting point and basis of The Accursed Share. His discussion centers on the idea of the 'general economy', a phrase that goes back at least to Priestley, and which was examined briefly by Mauss. The general economy is the total system of exchange between humanity and its surrounding environment. It is a profoundly ecological and holistic concept because it integrates the natural world into the flow of matter and energy in the human realm. Bataille was one of the first thinkers of the 20th century to observe this point. He notes, "Economic phenomena are not easy to isolate", and because of this fact "there [is] a need to study the system of human production and consumption within a much larger framework" (1988: 20). Our limited human economy is only "a particular aspect of terrestrial activity regarded as a cosmic phenomenon" (ibid). The cosmos is the background and source of all our activity, and as such it must be accounted for in the total description of the human condition.

Bataille then states his central thesis about the concept of the abundance, namely, that *all living organisms survive and grow under conditions of a surplus of energy.* In his words:

> The living organism, in a situation determined by the play of energy on the surface of the globe, ordinarily receives more energy than is necessary for maintaining life; the excess energy (wealth) can be used for the growth of the system; if the system can no longer grow, ...it must necessarily be lost without profit; it must be spent, willingly or not, gloriously or catastrophically. (p. 21)

The key idea here is that life in general exists and thrives within an abundance of energy. This is a basic physical fact of the general economy that is often overlooked. The Earth's biosphere has in fact two sources of abundant energy: the light/energy of the sun, and the mass/energy of the Earth[15]. The mass of the Earth, something on the order of 10^{28} g, is a potentially tremendous source of energy, of which life can as yet access only the smallest fraction. The sun likewise transmits to us far more energy than life can absorb. The Earth captures approximately 3×10^{24} joules each year, representing about 55% of the energy striking the planet and its atmosphere (the other 45% is reflected back into space). Of the portion absorbed, the vast majority is re-radiated back out into space[16]. This flux of energy continually passes into and out of the biosphere, fueling the metabolism of the life systems. There is far more solar energy available to life than it can at present use, just as there is far more mass/energy in the air, water, and minerals of the Earth[17]. "On the surface of the globe, for *living matter in general*, energy is always in excess." (p. 23).

Thus life exists in a condition of 'glorious abundance'. This is the first principle of the general economy. The abundance is so great, in fact, that it must become 'wasted', or at least go unused. This fact is of preeminent importance to Bataille. To such a condition he assigns the special term *superabundance.* Life has not merely an abundance of energy, it has a superabundance, an exuberant excess that far exceeds its ability to contain or absorb.

Living organisms use this superabundance in very prescribed ways. A growing organism is literally building up its internal store of energy. In this case, a relatively large share of the surplus is captured and retained. As the organism reaches maturity, it approaches a more stable metabolism, and thus is able to use less of the surrounding superabundance; it 'wastes' more. When the organism is nearing the end of its life, it may begin to whither and decay, thus undergoing a net loss of energy. At death, the material of the physical body is completely returned to the biosphere, awaiting new transformations.

Surplus energy is thus used first for growth, and then for maintenance of living systems. This applies both to the individual life form and to the species. As an individual grows, it literally absorbs more energy by becoming physically larger. As a species grows, it too absorbs more energy by becoming more populous. *Homo sapiens* grows first, as individuals, second as a species (increasing about 1.4% annually), but third, it grows in its capacity to expend energy via its tools, its technology. This latter point is of no small significance, as I shall elaborate.

Bataille's analysis here, as insightful as it is, is limited in a number of ways. First, it views the general economy from the human perspective and thus misses the larger implications -- more on this momentarily. Second, he believes that human growth is limited by the finite size of the Earth's surface, and that upon reaching limits to growth humanity will find itself with an unprecedented surplus to expend. As he says,

> Only the impossibility of continuing growth makes way for squander. Hence the real excess does not begin until the growth of the individual or group has reached its limits. ... [I]t is the size of the terrestrial space that limits overall growth. (p. 29).

But Bataille is thinking in crude terms of human numbers. In one sense of course he is right; the number of people on the face of the Earth must inevitably reach some maximal limit. But two other things can happen: the human species can expand to other planets and outer space, and more importantly, *the terrestrial growth can continue but in a new form*. Growth of the human species, I contend, becomes growth in the complexity, intensity, and distinctness of the social 'organism' and its attendant collective mind. *Superabundance gives rise to new structures, ones that are able to gather and use the excess of energy*. Social structures are one such example, but there are many others. Bataille hints at some such understanding when he says, "the dominant event [on Earth] is...the production of increasingly burdensome [i.e. consumptive] forms of life." (p. 33). But he fails to draw out the consequences.

Bataille's thinking has other weaknesses. Some of these were already mentioned: he does not acknowledge the work of Simmel in articulating the importance of exchange; he lacks an understanding of the new physics; and he suffers from the dual limitations of anthropocentrism and crude demographism. Furthermore, he underestimates the role of technology in the growth of the social organism. And his analysis of the gift fails to grasp the inherent reciprocal nature. Yet his central insights are of vital importance: The general economy is chiefly characterized by luxurious abundance, and it is in such an environment that life evolved. Society creates its own element of abundance in its restricted human economy, and this 'accursed' excess[18] will be expended in a manner that defines each given society. What is central is "the *general* point of view based on the exuberance of living matter as a whole. Anguish is meaningless for someone who overflows with life, and for life as a whole, which is an overflowing by its very nature." (p. 39).

So to complete this line of thought: I return finally to Teilhard and his philosophical development of the concept of superabundance. Recall that Teilhard holds that the emergence of society is the second great wave of 'hominisation', of new psychic or mental qualities emerging on Earth. The collective consciousness or group mind of humanity is the next phase of evolution. The cause of this phenomenon is something he describes both implicitly and explicitly as superabundance.

It is clear that the concept of energy plays a central role in Teilhard's philosophy. With his scientific training and general awareness of the importance of energy in the new physics, it is not surprising that the idea of abundant energy should be seen by him as a driving force in evolution, as a source of creative transcendence. This cosmic energy resulted first of all in an expansion of the human species, with concomitant increases in interaction and exchange. Eventually interaction reaches a point where, in the words of Teilhard,

> [W]e are witnessing a *formidable upsurge of unused powers*. Modern man no longer knows what to do with the time and the potentialities he has unleashed. We groan under the burden of this wealth. ... Sometimes we are tempted to trample this super-abundance back into the matter from which it sprang without stopping to think how impossible and monstrous such an act against nature would be. (1959: 252-3).

Shortly afterward he notes that this super-abundance is not only an energetic quantity, but also *mental*: "the great human [social] machine is designed to work and must work -- by producing a super-abundance of mind." (ibid: 257).

Teilhard noted that the 'superabundance of mind' was important, but the idea was not fully addressed by him. This is perhaps not surprising, since he wrote the bulk of the manuscript for Phenomenon of Man in the late 1930's[19], nearly 10 years before Bataille wrote The Accursed Share[20].

4) On the Relationship between Capitalism and Technology

Bataille's underlying objective in The Accursed Share is a new and fundamental critique of capitalism[21]. He sees capitalism as inherently deficient because it is based on *accumulation* rather than *expenditure*[22]. Accumulation is achieved through production, but especially on accelerated and continuous production. Capitalist organizations achieve this in a novel way, by *funneling the economic surplus back into the process of production*. This has the effect of producing a system with *positive feedback*, and hence rapid growth. Such a process is destructive to the social order because it rapidly transforms the nature of society and leads to dangerous instabilities; commenting on The Accursed Share, Richardson notes that the capitalist surplus "assumes uncontrollable and potentially catastrophic forms in the shape of conflict of interest, global warfare, massacres, pollution and nuclear explosion" (1994: 94). He adds that, "For Bataille this process is inherent to capitalism and cannot be reformed." (ibid).

This danger to society was recognized historically in the prohibition of *usury*, which was seen as a moral wrong precisely because it used wealth to create wealth. But usury has long since metamorphosized from a sin into a virtue. Since the time of Adam Smith capitalist organizations have relied extensively on their surplus -- their profit -- as a means of creating yet more wealth. As a result of this distortion of the general economy, capitalism manages to create an artificial scarcity and corresponding inequities in wealth, as rich individuals and powerful corporations seek to monopolize for themselves the economic surplus created by all people. Richardson puts the matter concisely:

> The ideological thrust of a restricted economy based on production has served to hide from us the fact that our natural propensity in itself creates a

> surplus of wealth. In so far as there is poverty in the world, it is not caused by a scarcity of economic means but by the fact that one person's surplus has been appropriated by another. (ibid: 95)

Whatever the weaknesses of capitalism, it succeeds spectacularly in growing the (restricted) economy, creating wealth, complexifying society, and drawing in energy from the natural world -- factors which are intimately related.

In Western capitalism we have found the most efficient means for growing the restricted economy, and for rapidly evolving the social mind. The surplus of human-to-human exchange, and the surplus of human-to-nature exchange, are collected, focused, and channeled back into the production of yet more surpluses. No other socio-economic system has been able to exceed free-market, 'democratic' capitalism at this process. No other system has as effectively produced the positive feedback necessary to grow the system so rapidly. This, I believe, accounts in part for the 'victory' of Western-style capitalism in the battleground of global ideologies.

In such a picture we can see the critical role played by *technology*. Capitalism requires tools to achieve its growth, and these technological tools work both within the human-to-human and the human-to-nature spheres. The larger that a system of exchange becomes, the more communication and coordination that is required. Global enterprises require rapid exchange of information and must process large amounts of data on a regular basis. This is simply not possible without advanced electronic technology. From globalized business networks to the local neighborhood 'superstore', large commercial operations are completely reliant on advanced technology.

In the human-to-nature realm, technology is required to access the natural energy surplus, and to convert it into usable form. Whether it is the extraction of deep-sea oil, construction of electric solar panels, or the nuclear fusion of hydrogen, new energy production methods are intimately tied to advancing technology.

This implies a new definition of the basic nature and purpose of technology. *Technology is the means for extracting and circulating energy within the human sphere.* This is its primary 'purpose'. Technology is the principle mode of participation of the social being. In the era of primitive technology, the social being was weak; its corresponding mind was likewise of low intensity. The evolution of human culture paralleled the evolution of technology. Society grew in numbers and complexity in direct proportion to the development of technology. Cultures that had greater access to energy via technology were the ones that evolved the fastest, and exerted the most power throughout the world. The feedback process of technology accessing materials and energy, yielding new and more powerful technology continued, ultimately finding maximum freedom in modern capitalism. The end result is a high-intensity modern social being, sustained by modern technology, possessing powerful noetic qualities.

5) Qualities of the Social Mind

Throughout this work I have held a basic assumption: *that which unites the human with nature is more important than that which differentiates it.* The past 2,500 years of science and philosophy has emphasized the ways in which mankind is distinct from the rest of reality. A balanced perspective requires that we grasp the elements of continuity. Mind is one such aspect, and participation is another.

We are all intimately familiar with the many varied and subtle qualities of the human mind. The individual mind is a special case of the more general phenomenon of mind that exists in all things. The social mind, as well, is a special case in point. It exists at a different level than the human mind, but since 'mind' is a universal characteristic it must necessarily share certain core qualities with the human mind.

This approach is supported by a number of developments throughout the history of philosophy. Many of the panpsychist philosophers used the human as a guide to understanding the general properties of the cosmos. Campanella proposed that the qualities of power, wisdom, and love (will) were the three primalities of all existence. Fechner explicitly argued on the basis of analogy to the human mind in developing his panpsychism. Schopenhauer developed his entire philosophy around the idea that the inner essence of things is the same as the inner essence of the human, which he concluded was 'will'.

Here I will propose and discuss eight central qualities of mind: (1) 'power', or *potenza*; (2) noetic unity; (3) small-scale unpredictability combined with large-scale stability; (4) sensitivity to small changes; (5) nested hierarchy; (6) love-of-being; (7) love-of-becoming; (8) participation. In this section I explore these qualities in light of the conditions of the mind of the social organism. However, I emphasize here that these qualities apply not only to the social mind but rather are applicable to *mind in general*, at all levels of being.

For the most part, only two leading thinkers have examined the qualities of the mind of the social organism: Durkheim and Teilhard. Durkheim recognized in it a kind of force, a "coercive power", that steered people in particular directions, and resulted in consistent patterns of social behavior across large populations. Teilhard saw the social mind as the result of a superabundance of mind, as a "formidable upsurge of unused powers" – another association of social mind with power[23]. This is an important insight, shared by these two thinkers: Mind as 'power'.

Hylonoism permits a further articulation. Social mind – that is, the collective mind of the social organism – is to be found in the exchange of matter and energy amongst human beings. It exists in and through this flow of energy. As such, it literally possesses the force of energy, with concomitant effects on the real world. The power of the social mind is closely linked with this process of exchange of energy; in this sense, the 'power' of social mind has an almost literal, physical interpretation. And yet this 'power' has an efficacy in the human realm that is subtler than the simple physical meaning. Hence it calls for a new name. Bruno explored the concept of power as related to being, and he called it *potenza* (recall my discussion in Chapter 5). I will adopt his term, and use it in reference to the unique power-quality of mind – whether social, individual, or any other level of being.

The social *potenza* is a function of at least three quantities. First, the *number of people in the society*. A society gains in strength as its numbers grow. In hylonoetic terms this means greater complexity and greater dimensionality of the phase space of the system. Just as the 'mental power' of a living organism corresponds with the number of neurons in its brain[24], so the 'noetic power' or *potenza* of society corresponds with the number of people.

Second is the *physical (mass)/energy involved in the network of exchange*. Generally speaking, a society that moves more objects, with greater speed, will be a more powerful force than one that does not. Such movement both requires great expenditures of energy, and simultaneously possesses a great energy. Hitler recognized this fact, and it resulted in his successful deployment of *blitzkrieg* warfare. Leopold Kohr understood this, and it figures prominently in his analysis of the 'social size' of a given society[25]. It is recognized in economic terms when we convert the exchange of goods and services into the common denominator, money. The U.S. economy has perhaps the greatest single effect, both positive and negative, of any nation in the world; this is not because the average American exchanges so often or is so productive, but because of the high total energy and total value circulating within the realm of the U.S. economic system. American society has among the greatest *potenza* of any social group, and this is a function of both the large number of people and the large rate at which (mass)/energy is exchanged[26].

The third quantity relates to the complexity and structure (*potenza*) of the 'units' of the social mind, which for human society are human beings (just as neurons are the units of the individual mind). Human minds also possess a *potenza*, and this power is essential to describing the character of the social mind. Hence this third quantity is the *potenza of the individual people themselves*. In this way *potenza* is a recursive quantity, dependent upon the *potenza* of the subsystems within it. This third factor is essential because it is clear that a system of, say, 100 million robots exchanging mass and energy equivalent to a typical human economy would not possess the same complexity or power, because the robotic 'units' don't embody a complexity equal to human beings[27].

Returning to the eight qualities of mind: the second, third, and fourth qualities relate to chaos theory and the interpretation of social mind as a complex, nonlinear dynamic system. A society is like any dynamic physical system: it can be described in terms of phase space. There exists a moving point unity in a phase space description of the social system, and this point describes the instantaneous state of every element in that society. This much is accepted by modern science. *The central insight of hylonoism is that such a point – the social hylon – constitutes a noetic unity, and represents the mental unity of the system.* The ontological structure implied by hylonoism requires that all dynamic systems possess, and co-exist, with something that we may call noetic unity. Hence we may presume that society possesses a unitary, singular mentality. This mentality exists in the same non-physical space as ours, the Partimens, but is of a quantum degree different – thus we cannot perceive it empirically, but rather only rationally (as Plato said, such a supra-human soul is "totally below the level of our bodily senses, and is perceptible *by reason alone*" – Philebus, 898d), or via direct intuition.

The third quality is that social mind acts in a manner corresponding to chaos, i.e. is unpredictable in detail but consistent and quasi-stable in large-scale features. This is virtually self-evident. No one is able to predict the details of social action, whether it is stock market movements, fashion trends, or election results. But we are all aware that a given society has a particular personality that distinguishes it from other societies. Hence social behavior is very much in line with the pattern of the quasi-attractor. The chaotic action of the social hylon represents the unpredictability of society, and the overall quasi-stability of the pattern represents the stable aspects – which include consistent patterns of economics, culture, and even the 'social facts' that Durkheim recognized.

Fourth, the social mind is sensitive, in the manner of chaos, to small variation. Here this means that small changes in individual human actions, or in the flow of energy in the social realm, can have large and unpredictable effects. This is highly counter-intuitive. Particularly in large modern societies, one is struck most often by the impotence of the individual. However, chaos theory points to a hidden but potentially great sensitivity to the actions of every element in the social system. In fact, as I pointed out in Chapter 2, *all* such changes have effects on the social mind, and it is only the magnitude of the change versus time that varies. In a suitably poised system, individual actions can have immediate and apparent effects. What precisely these effects are may be unpredictable, and which individual caused them we perhaps cannot say. But an understanding of dynamic systems tells us that *all individual actions have an effect.* This fact alone can have great bearing on individual actions.

Interestingly, this even recalls Kant's dictum of the categorical imperative: act as though your actions were a universal maxim. Kant argued that the only rational, ethical course of action was to generalize one's rule for action, and apply it equally to everyone in society. Lying, for example, is immoral because it is irrational to wish that *everyone* would lie (lying only 'works' in a society of truth-tellers). Kant's imperative is thus a general rule for moral action. In a similar vein, an understanding of the dynamics of society informs us that each and every one of our actions has an effect on the whole system, an effect that may be small or great. Rephrased as a 'participatory imperative': *act as though your individual actions have the largest possible effect on society*, such as becoming a universal law. Hylonoism follows Kant's example, and makes this claim on the basis of pure reason. Both claims rely not on empirical evidence, but on a deeper understanding of the principles of action. Ultimately, both are *empowering* visions of human action.

The fifth quality, nested hierarchy, recalls my discussion of the total human mind as a 'society of minds'. All levels of the physical body participate, with the organs, cells, and molecules each contributing their own noetic unities. The 'brain-mind' is at a central point in this hierarchy, and acts as the *hegemonikon* or leading part of the total mind. Such a view is inherent in the hylonoetic description of reality. Each level of existence, from atoms to societies and beyond, possesses a noetic unity given by the hylon in phase space. Any higher-order mind is a composite of many sub-orders of mind.

The social organism, like all structures, is hierarchical. It is likewise a 'society of minds'. Each subset of people constitutes a quasi-distinct social organism, with a corresponding noetic unity. Each family, each community, each corporation, each state constitute a fuzzy-yet-discrete entity, each describable in terms of a hylon trajectory in phase space; the sum of these composes the social mind of a given nation. The structure of the national government then serves the central role of *hegemonikon* of the nation. In the past few hundred years, international interaction has increased to the point where national collectives are blending into continental and global collectives; this is the emergence of the global mind of which Teilhard wrote.

To emphasize: By 'society' (in the human realm) I mean *any interacting group of people*, small or large, temporary or persistent. A family constitutes a social mind, as does a business meeting of a dozen people. Each classroom of students has a social mind, with the instructor serving as the *hegemonikon*. Any large-scale organization, such as a corporation or a nation, is a composite of a large number of nested lower-level social minds, that ebb and flow in varying degrees of intensity.

Sixth: All objects, all systems, seek to maintain their structural integrity. Living systems strive to maintain life in the face of environmental stresses and hazards. But not only life: all systems and structures act to maintain a degree of existence. Even 'inert matter' resists force (by Newton's 3rd law), acts to maintain structural coherence in the face of physical stresses, and generally persists in the presence of continual interaction with the environment. This quality is a fundamental datum of ontology. I will call this tendency 'philontos', *love-of-being*.

The social mind exhibits the quality of philontos. It seeks to preserve and maintain itself, not in the same manner that a living individual seeks self-preservation, but in an analogous sense. Thus it exerts its *potenza* in the physical world such that it maintains existence. As a highly dynamic structure, it continually loses energy to its environment, i.e. it is highly dissipative. The friction generated by exchange wastes energy, and literally heats its surroundings. In order to sustain itself, it continually requires new supplies of energy. This energy renews its structure and sustains its physical and psychic metabolism. And technology, as I explained, is the primary means by which the social organism takes up and circulates this energy.

The social mind imposes its desire for existence on individual people. This is perhaps the most tangible manifestation of the social *potenza*. First, its very existence is based in the process of exchange, as I explained. Exchange has the remarkable property of simultaneously benefiting directly each participant (through the increase in personal value) *and* of intensifying the social mind, thus bringing it into a condition of greater self-realization. There is a fundamental, built-in incentive for people to intensify the social mind, through the process of exchange. Human benefit and 'social benefit' (i.e. well-being of the social organism) occur simultaneously. Furthermore, the social mind seeks energy through individuals and through technology, *so it effectively confers beneficence upon those who serve it.* This explains in part the highly paid wages of stock traders, oil magnates, and technologists. Anyone who works to increase trade, increase energy extraction or consumption, or provide the means for these, is rewarded by a system whose very existence depends on such activities. They are rewarded *intrinsically*, in the process of exchange, and they are rewarded *extrinsically*, by a social system whose needs they serve.

The nature of philontos is of a striving, or a desiring[28]. The social organism, and all living organisms, possesses a mind that 'seeks' to sustain and grow or reproduce itself. Growth and reproduction require energy. Thus energy is the ground of being for life and mind. The social mind exhibits a will that is manifest in the desire for uptake and circulation/exchange of energy, in various forms. Its means for doing this is technology. The faster it can do this, the more it grows, and the more intensely it exists. This idea suggests a re-articulation of Nietzsche's dictum of 'will to power': it can be more precisely interpreted as a *will to energy*[29].

The will to energy is a corollary to the social *potenza*. This *potenza* cuts across both the physical and mental aspects of reality. It is grounded in the flow of mass and energy, but it exerts a psycho-social force upon individual people in society. Therefore it is a total phenomenon, and a fundamental quality of existence. The dynamic and persistent nature of the social being yields behavior consistent with philontos; it persists, and acts to prolong this persistence through the exertion of its *potenza*.

Seventh: I have described philontos as a fundamental ontological quality, as a will or love-of-being. In the case of society, we find a highly dynamic system that persists only through the continual up-take and circulation of energy. However, *this very process changes something of the social being.* The state of the components of mass and energy is continuously changing, as are the locations and actions of the individual people. In phase space we can describe this as a quasi-attractor pattern that (like all strange attractors) never identically repeats itself, that always moves to a 'new state of being', all while staying within the generally stable pattern of the social attractor. The personality of a social system persists, even as that system evolves through different states. Strange attractors never repeat the same identical state; this fact corresponds to our intuitive feeling that a complex dynamic entity like a society never exactly repeats itself, even if certain large-scale themes seem to persist.

Beyond this normal 'steady-state' mode of change, there are at least two other senses in which a social system can undergo more dramatic and fundamental change. First, the system may reach a threshold point of energy intake that causes a deep restructuring of the system – recall my discussion in Chapter 3 of the 'critical threshold' of energy. A highly complex system like a modern human society likely has numerous thresholds of energy intake, which, when reached, result in radical restructuring of at least parts of the society. A nation or a corporation cannot continually increase its energy metabolism without undergoing substantial and unpredictable change in its organization. Second, the system may grow in intrinsic complexity, such as through an increase in numbers of people or an increase in the modes of communication (witness the internet) that again substantially increases its *potenza*, and thus causes deep levels of change.

Love-of-being necessitates intake of energy, and this very process necessitates change. This process of change is more appropriately seen as a process of *becoming*. Thus being and becoming co-exist, and co-define one another. Love-of-being, philontos, cannot exist without a *love-of-becoming*, a condition I call *amascens*[30]. Amascens is part of a *process of perpetual becoming*, or *perpetual emergence.* Both being and becoming are ever-present aspects of all that is. T*he love-of-being necessarily involves* *a love-of-becoming*: Philontos implies amascens. Being implies transformation. Love-of-being and love-of-becoming are equi-primordial aspects of existence.

Eighth: Both of the above conditions are manifest through the up-take, circulation, and expenditure of energy. The social organism takes energy from the superabundance in its environment, makes it 'its own', and thereby sustains and transforms itself. This whole process is *deeply participatory*[31]. Participation is the underlying nature that encompasses the two processes of being and becoming – see Figure 1.

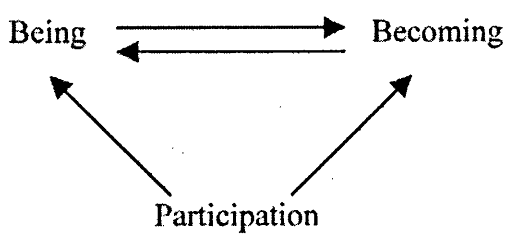


Figure 1 – Participation as the ground of Being and Becoming

This tripartite relationship may be seen from two sides, that of the Partimater and that of the Partimens. From the material perspective, it represents a dynamic, process view of mass and energy. The means by which participation is physically embodied is in the manifold forms, structures, and systems of the universe. From the noetic perspective, it represents a panpsychic vision of mind, of mind as immanent in all levels of being. Thus participation is the unifying factor of a Participatory Reality. *In this sense participation is the single most fundamental fact of existence*[32]. It underlies being and becoming, mind and matter.

The social mind exists in and through participation. As such, it exhibits the fundamental qualities of love-of-being (philontos) and love-of-becoming (amascens). These two qualities are unique among the eight that I listed above, in that they constitute the *core values* of the social being. We can say that the social mind 'loves to be' and 'loves to become', and that all its actions are centered on, and derive from, these core values.

The human mind, like the social mind, is a living aggregate mind. It too shares the eight central qualities that I described above. Many aspects of the first five qualities I have examined in previous chapters. As with society, *all human values center on the two core values of philontos and amascens.* (This statement has many implications for the study of ethics, and for the most part I leave this to future inquiries.) And like society, human 'being' – and human 'becoming' – are fundamentally grounded in the process of participation. *Participation is the core of human existence, social existence, and all existence.*

6) Conclusions and Summary of the Thesis

All living systems possess a mind, one that is a consequence of the participatory nature of reality. Living systems are aggregates or collections of like 'units', that exist in a feedback network of exchange. The mammalian brain is an aggregate of neurons; their interaction and exchange of energy yields the 'brain-mind'. Organisms are multi-level aggregates: atoms structured into molecules, cells structured into organs. The interactions of all these levels yield the 'total mind' of the organism – of which the 'brain-mind' is the dominant part.

Human societies, or more generally any collection of interacting individuals, constitutes a 'group mind' or *conscience collective*. Perceptive individuals, including Fechner, Pierce, Durkheim, Royce, James, and Teilhard, have long recognized the existence of such a mind in human society. As it happens, they lacked the conceptual tools to formulate a precise picture of it.

The social mind has eight important qualities. Like all dynamic systems, it exhibits properties of nonlinear feedback systems: a noetic unity (hylon), small scale unpredictability (chaos) within a larger framework of a quasi-stable pattern of behavior (virtual strange attractor), and extreme sensitivity to small change. The social mind has a hierarchical substructure that mirrors its physical hierarchy. It possesses a force or power, that I call the *potenza*, over both its 'units' (the individual people) and over the other species and the ecosystems with which it interacts. Ontologically, social mind is fundamentally a process of participation. Both its being and its becoming are a direct consequence of this. Like all systems, it displays core values of philontos (love-of-being) and amascens (love-of-becoming), and acts thereby to preserve and enhance itself.

The key process that draws individuals into something that can meaningfully be called a society is that of exchange. Simmel was the first to acknowledge the philosophical significance of this. His study of society as a system of interactive exchanges illuminated the importance of exchange, and its role in the production of value. In modern terms we can now envision this process as a virtual conversion of energy into value, and consequently into the social being.

Mauss saw that the process of exchange was intimately tied up with that of mind. He found this in native cultures, where the gift was the basis of exchange. The gift has both a material aspect and a spiritual, noetic quality. Whereas native people saw mind in the gift itself, hylonoism sees it in the *process* of participation and exchange. Mauss argued that society must return to such an 'archaic', ensouled vision of interaction. I claim that we are in the midst of this very return, though at a level of greater evolutionary perspective.

Exchange necessarily involves a loss, both of the 'thing given' and of the energy lost in the transaction. Any system of continual exchange requires continual replenishment. Under appropriate conditions, where both matter and energy are not merely abundant but superabundant, structures will evolve that 'make use' of this abundance. Life on Earth thrives under conditions of superabundance. The condition of the general economy, as Bataille observed, is not one of scarcity and want but of surplus, excess, and exuberance. Humanity taps into this superabundance and evolves itself.

For thousands of years the focal point of human evolution was the individual and small collections of individuals. When humanity reached certain critical milestones in its ability to tap into the natural superabundance, the evolution of the social being accelerated beyond the scale of the individual. This resulted in a new order of human existence, with the social being thriving as a quasi-independent entity. Thus we find ourselves today in the midst of a fundamental tension between the human-scale level of existence and large-scale society.

Both of these levels exhibit love-of-being and love-of-becoming. Increasingly these values conflict, as the social being channels and absorbs the natural superabundance. This necessarily impacts people in society, as well as the surrounding environment. The coercive power of the social mind causes most people at most times to adapt and modify their personal values in support of the social values. Other times people continue to hold human-scale values, or ecological values, in priority. Many social conflicts are rooted in these divergent systems of values. Only a deep comprehension of the nature of the conflict can result in adequate solutions.

* * * * *

The participatory approach to thought and action has been present in various manifestations for over 2500 years. I have traced much of this legacy, and noted the many correspondences with panpsychism and hylonoism. My extensive historical recounts have been necessary because the roots of participatory philosophy run very deep in Western civilization; and any thorough attempt to construct a new worldview must have a deep sense of the history of the human project. Only in the past 30 or so years has participation taken on a fuller meaning, and demonstrated the potential to provide an alternative worldview to the dominant Mechanism. The recent works of Wheeler, Skolimowski, Bohm, Abram and Berman have all brought the philosophical concept of participation into the public realm. In the present thesis I have sought to extend their insights and further articulate a philosophy of participation.

My outline of a Participatory Worldview is based on seeing participation as the central quality of existence. Being and becoming are seen as universal consequences of the varied participations of matter and energy. Mind co-exists with participation, and resides in all structures. Chaos theory gives us a new vocabulary in which to describe the qualities of mind and existence, and points to deep unities throughout the universe.

Due to its participatory nature, all mind possesses the ability to co-create, and thus 'make', reality. The nature of this co-creation is proportional to the *potenza* of the mind. The two-way physical interaction of material objects co-exists with a two-way noetic interaction, resulting in mutual transformation.

Of particular relevance is the meaning of participation in the human realm. I have argued that we ourselves are participations, both from within and without. Participation with other people results in a collective social being, which has important consequences for individuals. The social being possesses a group mind with qualities comparable to the human mind. It acts to express its core values of love-of-being and love-of-becoming, often to the detriment of smaller- and larger-scale structures, such as individual people, indigenous communities, or eco-systems.

Following most contemporary physicists, I see *energy* as the central physical quantity, and its movements and exchanges in various forms (including the form of matter) comprise the most tangible and visible aspect of participatory structures. All structures are composed of energy. Since all are dynamic at some level, all must necessarily dissipate energy in one form or another. Therefore, all structures require a source of replenishment to prolong their existence: animals require food; plants require sunlight; the social being requires human interaction and exchange through the use of technology.

In the largest sense, participatory panpsychism suggests a new, more integrated view of the natural world. It places humanity, and the human *mind*, firmly within a rational, natural order, one that does not deny or minimize our uniqueness. The hylonoetic theory of participatory mind helps to resolve a number of long-standing philosophical problems, including unity of consciousness, emergence of mind, the 'combination problem', and certain issues surrounding the evolution of structure. Perhaps most importantly, participatory panpsychism *engenders a new feeling for the world*; it points toward compassionate and sympathetic values, toward a sensitivity to subtlety, toward a sense of belonging.

Participation is at the heart of all existence. It is the foundation for all modes of being, and all modes of becoming. It is the basis for both the hierarchy of physical structures and the corresponding hierarchy of mental structures that exist throughout Participatory Reality. Each person, each being, participates in the cosmic reality, just as the cosmos participates in each of us. We form a co-evolutionary totality, maintaining both individuality and interconnection throughout our existence. That which is outside also dwells within, and one's innermost subtleties affect the entire universe. In an era of atrophied vision, such a Participatory Worldview holds out perhaps the greatest promise for the future.

NOTES:

[1] Followers of Durkheim, including Mead and the more recent sociologists and social psychologists, have tended to emphasize the effect of society on the *individual* rather than the 'mind of collective' as such. These matters are less relevant to my thesis, so I will leave them aside.

[2] I exclude here the idea of the cosmos as a 'living creature', an idea that goes back at least to Plato and the *Timaeus*. This is the extreme case of the phenomenon of an aggregate mind, but is not particularly helpful in this discussion, for two reasons: First, because the universe is so vast and difficult to comprehend, it is of less value in understanding ordinary-scale events. Second, because this idea and the related concept of the 'world-soul' have a strong overlap with theological ideas about the nature of God; this religious influence tends to distort the deeper philosophical significance.

[3] I hold to a different conclusion, namely, that social cohesion and 'intensity of group mind' is increasing, but that this occurs concurrently with a *decrease*, or rather *restriction*, in the individual consciousness and individual autonomy.

The modern person is *both more and less constrained* than his predecessors. First of all, we are in a poor position to judge the subtleties of individual freedoms in foreign societies; activities that to us look uniform may contain a rich diversity of innuendo and meaning that we find imperceptible. The indigenous tribes that first encountered Europeans likely saw in them a large measure of conformity and homogeneity. Second, Durkheim fails to realize that as society grows in size and technological capability, *it simultaneously empowers and restricts individual freedom.* The key parameter is the social 'power' (something that I will later call the '*potenza*') of the group in question.

Consider a spectrum of increasing social complexity. The lone individual has nearly complete autonomy, but none of the empowerment that comes with social participation (including the means supplied by technology). A small, 'primitive' society of low social power sacrifices a small amount of individual autonomy for the collective good. The members are relatively homogeneous in that each retains a large degree of self-autonomy, but they receive some social benefit via the group participation. A society of moderate power offers growing specialization and division of labor, and the social surplus provides an increase in personal wealth to the members of that society. Technology grows in complexity, and is able to mobilize greater amounts of energy. Decisions are made that are increasingly group decisions, in which no one person is responsible or accountable. Individuals gain in personal wealth and technological power, but they are subject to growing constraints. The social being imposes its values and makes increasing demands upon individuals. But people generally accept this, because they enjoy the growing personal wealth and power.

In a modern, high-power society, the social being comes to act with ever-greater autonomy. Decisions are made in which no one person, or even definable *group* of people, is responsible or accountable. It imposes its values on individuals, and increasingly supplants human-scale and ecological-scale values. Its intense modes of participation cause a growing homogenization in individual action, even as it offers unprecedented power and wealth to the individual. *Individual power expands, but only in the directions that favor the large-scale society.* People have less autonomy than ever, and are totally dependent upon the actions of society to supply even basic needs. And yet superficially they appear 'freer', and able to do more than in lower-power societies.

Consider a simple analogy of a highway system. The common view is that 'highways are good' because they allow people to travel faster and farther than ever before. It is true, highways give more mobility, but *only over a very narrow path of the landscape.* You have greater personal power, but only if you go where the highway lets you go. By becoming automobile-dependent, the modern person has tied himself to a restricted network of one-dimensional paths. In former times, a man could walk or ride in any direction he pleased. Cars go only where the roads allow. Which has greater freedom?

This subtle yet powerful coercion by the social mind causes most members of society to willingly surrender individual autonomy for power and wealth. Even the flow of ideas is carefully selected and chiseled such that this mindset is strictly reinforced.

Human autonomy is multi-dimensional. Modern social structures act to compress certain dimensions even as it expands others. The compressed dimensions involve human-scale values, human concern for ecological values, expressions of fundamental social criticism, expressions of technological criticism, desires for self-determination, spirituality, frugality, simplicity, human dignity. The expanded dimensions include technological power, wealth, narrowly-defined mobility, and narrowly-defined consumerism. Depending on one's perspective, such a tradeoff may be seen as beneficial and progressive, or regressive and tragic.

[4] Already in 1893 Durkheim wrote of "the well-worn expression, collective or common consciousness" (1893: 80).

[5] See also his (1942a), "Elements of truth in the group-mind concept".

[6] Let me emphasize here that by the term 'social mind' I do *not* mean it in the sense of the linguistic constructivists, i.e. 'individual mind as determined by the social conditions' (as was articulated, for example, by Mead (1934), or more recently by Berger and Luckmann (1966)). They focus on the mind of the individual person; I deal with the mind of the social group as a whole. My 'social mind' is strictly the mind of the collective, of the social organism.

There is an important linguistic connection to my conception of the social mind that I want to acknowledge. Social mind is based in exchange, and a dominant mode of exchange is clearly language, both verbal and written. Language is a subtle form of energy exchange that utilizes our unique human abilities. It is clearly an important component in the total social mind. However, I am exploring the nature of exchange in general; to focus on the linguistic component would be too detailed for this thesis.

[7] In this example I emphasize the temporary relationship between two individuals as they exchange goods. This is a particularly intense form of participation, compared with the normal, on-going relationship between, say, a customer and a baker. All people in a given community exist in a continuous mode of participatory interaction, as defined by the larger social community. This larger participatory relationship is a continuous and essential element in the lives of individual people. Within this larger framework there arises smaller temporal exchanges and participations, based on our numerous day-to-day interactions. Here I focus on the nature of these local, more intense forms of participation, in order to better illuminate the general phenomenon of exchange.

[8] Altruism is a problematic concept in any case. If I, in any sense, identify with my fellow humans, and then I do something 'altruistically' to help them, I am in some sense benefiting myself -- both in the pleasure of knowing I helped, and more directly, in that I am part of the larger social body, so that helping that body is helping myself. The same argument holds for assisting wild animals, protecting trees, etc.

[9] The concept of value is also contentious, if only because it defies conventional definition. I wish not to make too much of this point here; I will use the term in the loose, subjective sense.

[10] Again, this is not to exclude the larger framework of participations with the natural world. These are of course more fundamental than the social network into which we are

all born. The general concepts of exchange that I have outlined here in reference to human society apply as well to our participations with nature.

[11] Of course, as I explained in Chapter 7 all things are to some degree in contact with one another, so it is technically not possible to have 'no communication at all'. The issue is one of degree. Certain modes of social exchange are more forceful and dominant than others.

[12] A more contemporary German word for 'superabundant' would be *ueberreichlich*. Nietzsche did not use this word, to my knowledge.

[13] Certain indigenous societies, even including the more ancient hunter-gatherer ones, had their own, different forms of surplus that allowed their indigenous cultures to flourish. It seems clear that even in a low-technology society humanity can tap into the natural abundance of the environment and, when freed from the scourges of overpopulation, colonization, etc, develop sophisticated and articulated cultural systems.

[14] First published in France posthumously (1967); first English translation in 1988.

[15] Bataille acknowledges only the solar source of energy. He seems generally lacking in knowledge of the philosophical implications of relativity physics.

Furthermore, there are actually three sources of energy, if we count the zero-point energy. But it is not clear that life actually has a tangible access to this, so I will leave it aside here.

[16] The phenomenon of global warming is a condition wherein human activity modifies the Earth so that it retains a greater percentage of received solar energy. Retained energy must go to one of three sources: greater mass of the Earth (i.e. greater plant mass), increased temperature, or greater 'kinetic energy' in the circulation of the Earth's general economy.

Penrose (1989) points out that the Earth absorbs 'low entropy' visible light, and emits 'high entropy' infrared radiation (heat). The total energy is the same, but it changes from low entropy form to high entropy form, due to the actions of the air, water, land, and living organisms.

[17] This point begs the question of the evolution of life and complexity on other planets. On my view, there is no fundamental reason why complex structures should not evolve anywhere that there is a surplus of energy, matter, and perhaps most importantly, *mobility*. Mars seems to have had proper conditions at one time, but the absence of liquid seas and any substantial atmosphere would suggest a strong limitation to the evolution of complexity (at least on the surface). Water seems to be an *ideal medium of exchange*, allowing forms of energy to interact and become more complex. Without the ability to mobilize matter and energy, exchange is restricted and thus unable to support complex structures. Certainly other liquids or gases could fill this role, and it is an open question whether non-water based 'life' will be found somewhere.

Mercury has an abundance of energy and matter, but like a desert, has been baked dry of the means for mobility; therefore complex structure is highly unlikely. Venus is a more promising prospect, with its relatively dense atmosphere providing at least a gaseous, if not liquid, means of exchange. Unfortunately its surface, too, appears devoid of mechanisms of exchange, and its high surface temperature (in excess of 400 deg C) clearly rules out Earth-like processes. However, Jupiter and Saturn, and a number of their moons, seem to have both superabundant energy and the means for exchange; complex structure, perhaps including life, is certainly possible. The three outermost planets also have abundant energy, though at a much lower intensity than elsewhere in the solar system; with very little internal heat energy, nor substantial atmospheres, one would expect a vastly slower rate of evolution on these planets.

[18] Bataille saw the social surplus as accursed because it resulted, in modern society, in decadent expenditures. I attempt to refine and extend the reasons for the accursedness of the surplus. For me, the surplus of wealth and energy necessarily gives

rise to a social system and social organism that is fundamentally anti-human scale. The surplus is beneficent to the society as a whole but destructive to human-scale structures and values.

[19] Per Julian Huxley, in the Introduction to Phenomenon of Man (1959: 24).

[20] Both books were published significantly later than they were written: Phenomenon in French in 1955 (the year of Teilhard's death), and The Accursed Share in French in 1967. By this measure, neither work influenced the other writer. To my knowledge no other writer has addressed these themes, so I can only assume that Bataille and Teilhard developed them relatively independently.

[21] For an outstanding discussion of this point, see Richardson (1994: 67-96).

[22] This makes an interesting counterpoint to the modern critique of capitalism as deficient because it emphasizes *consumption*. There is, of course, a connection between these ideas, and Bataille recognized this. Any accumulation is only temporary and must ultimately be spent on some 'consumables'. An accumulation is a consumption deferred. The issues are rather the magnitude of accumulation, and the mode of expenditure/consumption.

[23] I note in passing that Marx also explored the relationship between mind and power. Cf. Lukes (1974).

[24] Not all mental capabilities are tied directly to number of neurons. There are controversial case studies on humans in which the loss of a large number of neurons appears to leave mental functioning largely intact. But clearly some degree of functioning corresponds to neural count; a 1 million neuron brain will necessarily be less capable in many ways than a 1 billion neuron brain.

[25] Cf. Kohr's analysis in his book Breakdown of Nations (1957: 45-6).

[26] An interesting economic metric would be an assessment of the brute physical energy contained in a given economy. This could be done quite easily in conventional physical terms by calculating the mass x velocity of every economic good that was moved. An economy that moved many massive objects at high speeds would result in a high 'power rating'. An even better assessment might include a true measure of physical power by dividing by average moving time – i.e. moving lots of objects at high speed in one day is more energetic than moving the same objects at the same speed but distributed over one week.

Such a metric would correspond roughly to *total energy consumption* of a given economy, but with a better focus on the exchange process rather than expenditure process. Measuring energy consumption has the advantage, however, of capturing activity related to services and to such exchanges as 'information' – the latter of which requires electrical energy, energy for the production of computers, etc.

[27] This is not to imply some fundamental limitation on the potential complexity of machines. Certainly it is conceivable that a 'robot' may some day achieve a complexity and *potenza* equal or greater than human. I simply mean it in the sense that we understand the term 'robot' today.

[28] As such it can be compared with the notion of *will*. As I noted in Part II in my discussion of panpsychism, the quality of will has been seen as being of central importance by numerous thinkers and philosophers. Even as far back as Empedocles' concepts of Love and Strife, one finds the notion of 'seeking' or 'desiring' as a fundamental ontological truth. Campanella developed the idea of will, or love, as one of his three primalities, present in all objects. Schelling created the concept of 'willing as primal being'. Schopenhauer made a great leap forward, identifying will as the thing-in-itself, the inner being of things. Nietzsche further articulated Schopenhauer, arguing that the will is not simply some nebulous desiring, but rather a very specific will, the *will to power* (*'Der Wille zur Macht'*). I make a few comments regarding Nietzsche in the text that follows, but for the most part I will not pursue this connection in this thesis.

[29] Physicists define 'power' as rate of change of energy production or transformation. The social will to energy is in reality a will to rapidly metabolize energy, and to thus exhibit and expend 'power' in the literal physical sense. Nietzsche understood the term 'power' (*Macht*) in both the social and physical sense. The will to power, in a social sense, is perhaps better interpreted as a will to 'power', in the physical sense – fundamentally, a manifestation of the will to energy.

[30] 'Amascens' is coined from the Latin *amo-* ('love') and *ascens* ('ascend', or 'transcend').

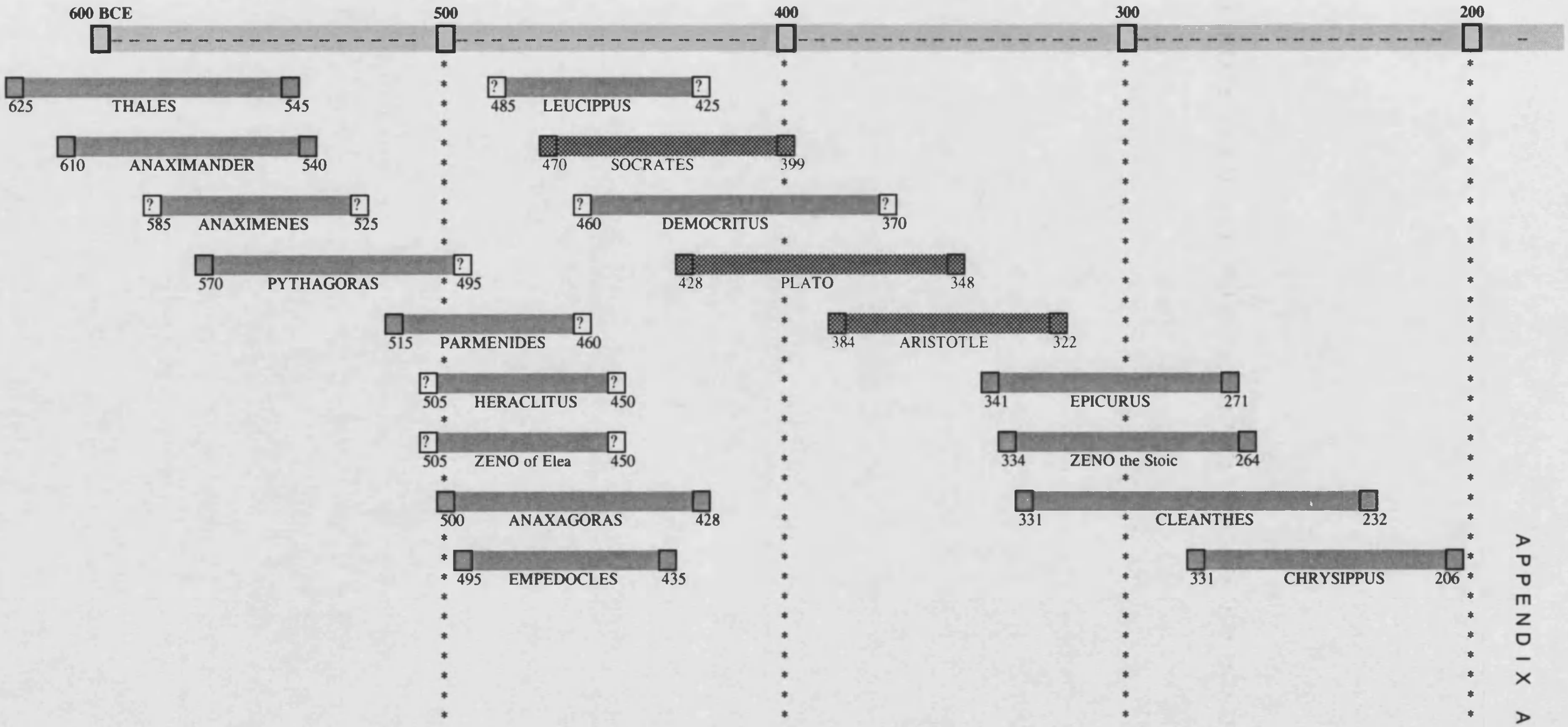
[31] In fact this description fulfills the three-part definition I presented in Chapter 1, in the deepest possible sense.

[32] There has been an interesting development of late that supports this view. Cahill and Klinger (2000) have developed a 'model of reality' that attempts to explain the emergence of all features of the physical world, including the structure of matter, laws of physics, and even the 3-dimensional nature of space. Their self-referential 'boot-strap' model, called the Heraclitean Process System, starts from conditions of intrinsic quantum randomness, and applies the rules of self-organized criticality (cf. Bak and Chen, 1991) in order to build up structure.

Cahill and Klinger's model has the feature that it does not presume the existence of material objects *per se*, but rather results in their emergence based solely on interrelationships between monad-like "pseudo-objects". These monads "are defined only by how strongly they connect with each other" (Chown, 2000: 26). As the model progresses, the initial pseudo-objects disappear, leaving behind a structure of relationships that they call "gebits" (short for 'geometrical bits').

These gebits are inherently participatory. They are the network of relationships between seed particles of quantum randomness, and in the Heraclitean model, they account for all forms of being and becoming in the material universe. Clearly it is too soon to draw significant conclusions from such work, but the initial results suggest a deep connection between participation and structure.

APPENDIX A -- TIMELINE OF IMPORTANT GREEK PHILOSOPHERS (pre-200 BCE)



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