

# The Emergence of Subtle Organicism

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## Introduction

Western science rests on the philosophical foundation of *materialist monism*,<sup>1</sup> according to which only physical matter exists and therefore only physical matter can be known. Furthermore, matter is known to us only through the sense organs or indirectly through instruments. Consequently valid knowledge can only be derived from a logical interpretation of sensory experience.

Materialist monism (henceforth materialism) also asserts that mind and consciousness are epiphenomena of matter. Mind is not a thing – mind is what the brain does. The neurobiologist Steven Rose defines mind as:

... equivalent to the sum total of brain activity for discussions within the universe of discourse at a hierarchical level above that of the physiological description of the interaction of cells and below that of social analysis. (Rose, 1976, p.30)

Rapid advances in neuro-science have bolstered support for materialism because each new discovery seems to support the premise that "there can be no change in the mental states of a person without a change in brain states" (Pinker, 1997), from which it is but a short step to the conviction that matter is the ultimate reality and all mental experience is purely derivative of matter.

Despite the remarkable achievements of Western science, its materialist foundations are not universally accepted. Furthermore a new philosophy of the natural sciences is emerging which leads one to ask if we are witnessing the early stages of a Kuhnian style revolution in Western science. The evidence for such a shift comes from a surprising number of "apostates" (Gilbert & Pinker, 2000), practising scientists going public with their loss of faith, not in the scientific enterprise itself but in its materialist foundation. This group of rebels do not necessarily agree on all things. However, their writings suggest that consciousness, mind and subtle energy fields will be essential categories in any new philosophy of the natural sciences.

Opposition to materialism has waxed and waned several times over the past one hundred years or so. Surprisingly, despite the measurement problem in quantum physics<sup>2</sup> forcing physicists to grapple with consciousness, it is biologists who have done the hard work to build an alternative philosophy for the natural sciences. The motivation for this essay is the emergence of another generation of biologists attempting to break free from the constraints of materialism and reductionism, even at the risk of their reputations and careers. Notable names include Jacques Benveniste (1935–2004), Rupert Sheldrake,<sup>3</sup> Candace Pert<sup>4</sup> and Elisabet Sahtouris.<sup>5</sup>

### Structure of the Essay

This essay explores the emergence of a new philosophy of the natural sciences. Its purpose is not to persuade the reader of the imminent demise of materialism but rather to explore the dynamics of the challenge facing materialism and the obstacles that must be overcome if any challenge is to be successful. We explore this question from three perspectives: the theory of scientific revolutions according to Thomas Kuhn (1922–1996), the theory of microvita according to Prabhat Ranjan Sarkar (1921–1990) and Sarkar's theory of cognitive evolution.

The three theories complement one another. Kuhn's famous book, *The Structure of Scientific Revolutions*, first published in 1962, offers a model with which to interpret revolutionary paradigm change. Sarkar's theory of microvita, introduced in a series of discourses from 1986 to 1990,<sup>6</sup> extends a set of physics metaphors (waves, particles, energy and multi-dimensional spaces) to formulate a substantive theory of mind. Part of the difficulty in embracing a science of mind and consciousness is the lack of suitable metaphors to describe the apparently intangible. And Sarkar's macro-theory of cognitive evolution situates contemporary debates about science in a larger perspective. Socio-historical factors have dominated theories of scientific change over the past century to the neglect of the cognitive. As Andersen, Barker and Chen (2006, p.18) observe: "... cognitive factors must play a role in any general account of historical change in science".

It proved impossible to write this essay without giving a name to the new philosophy which, by virtue of its emerging status, is not completely characterized and therefore difficult to name. I finally settled on *subtle organicism* for the following reasons:

- 1) Organicism is a biological doctrine concerning the relationship between parts and wholes. Parts can be understood only in the context of the whole but the whole is more than the sum of its parts.<sup>7</sup> Organicism satisfies the requirement for biological metaphors to understand natural structures whether living or 'non-living'.<sup>8</sup> Indeed, the rebel biologists extend their definition of life to include the earth and the universe itself. Microvita theory is likewise biologically oriented.
- 2) Organicism is close to holism and stands in opposition to reductionism, the belief that all explanations of living organisms can be reduced to the laws of physics. The rebel biologists reject physicalist and mechanistic accounts of the natural world.
- 3) Organicism seeks to discover fundamental principles of the part-whole relationship common to all natural structures, from bacteria to biosphere, from atoms to galaxies. Thus it satisfies the need for a unifying philosophy that encompasses multiple scales of reality.
- 4) There are many shades of organicism from the currently respectable (materialist organicism) to the discredited (vitalism). The latter, as Haraway (1976) observes, is really a mechanistic view of life with *soul* as the driver of the machine. Subtle organism is distinct from both. It is an organicism which admits non-material processes but preserves the unity of nature. It satisfies Alfred Whitehead's desire for "a more subtle science" (cited in Birch, 1990, p.144).

There is some risk in attaching the name *subtle organicism* to an emerging cluster of ideas, not all of which will necessarily last the distance. For this essay, I ask the reader to accept the name pragmatically. The essay has six parts:

1. A review of some of the anomalies confronting materialism.
2. A review of some of the important features of subtle organicism.
3. A discussion of the factors which influence resistance to paradigm change and, in particular, resistance to subtle organicism as a philosophy of the natural sciences.
4. An introduction to the theory of microvita, in particular those aspects which contribute to subtle organicism.
5. A discussion of the scientific method and how it might change in a transition from materialism to subtle organicism.
6. The macro-perspective – placing the struggle between materialism and subtle organicism in the larger context of the evolution of human cognition.

### **Anomalies in Materialism**

According to Kuhn, a scientific revolution begins with the recognition of *anomalies*, observations inconsistent with the prevailing paradigm. Recall that, according to Karl Popper, anomalies should represent falsifying instances, and one might expect those which we describe in this section to kindle doubt about the materialist paradigm. But not all anomalies are the same. To understand why most scientists keep the materialist faith we must distinguish three kinds of anomaly: legitimate, inconsequential and illegitimate.

#### *Legitimate anomalies*

Legitimate anomalies are better described as unsolved puzzles. They fall within the legitimate interests of one scientific community or another and there is every expectation that they can be solved without abandoning materialism. Any competing paradigm will have to provide an adequate account of the same anomalies.

### **The Matter Puzzle**

The fundamental concepts in modern physics are space-time, energy, charge, information and entropy, each of them an abstract idea rather than something material. Only some 5% of the calculated energy of the known universe is matter in the traditional sense while the remaining 95% (comprising 25% dark matter and 70% dark energy) remains a puzzle. For most physicists the matter puzzle is not a reason to abandon materialism. They fall back on the epistemological commitment – valid knowledge can only be derived from a logical interpretation of sensory experience.

### **Wave-particle Dualism**

Wherever matter manifests it does so with the contradictory attributes of wave and particle. How can these contradictory attributes be accommodated within the one theory? According to the orthodox interpretation, these attributes are *complementary*, meaning that whatever matter might 'really be', only its wave or particle attribute can

be observed at any one time – never simultaneously. There is no point speculating about the reality behind observations.<sup>9</sup> The wave-particle puzzle defies realism because it defies a logical model of what matter 'really is'. Complementarity demands we abandon realism. It is probable that any new paradigm of the natural sciences will have aspects that defy realism.

### **Quantum Indeterminism**

The waves described by quantum theory are not material but mathematical probabilities. Quantum uncertainty appears intrinsic to the subatomic world rather than a product of ignorance. This puzzle challenges another component of realism, the principle of cause and effect, according to which a unique set of causes should give rise to a unique set of results. Einstein could not accept the quantum assault on realism and believed that quantum theory was an incomplete account of the subatomic world.<sup>10</sup> Instead he and others proposed that the vacuum state must contain *hidden variables* which, if they were accessible, would enable a deterministic description of quantum events. Many experiments have been directed to this highly controversial issue but it is fair to say that the question is still open.<sup>11</sup>

### **The Origin of Life**

The origin of life is a fundamental puzzle of science. The machinery to replicate and manage the business of staying alive, even within the simplest of bacterial cells, is breath-taking in its complexity. There is no satisfactory account for the origin of life which falls entirely within the ambit of known physical processes.

According to the physicist Paul Davies, "Real progress with the mystery of biogenesis will be made, I believe, not through exotic chemistry but from something conceptually new" (Davies, 1999, p.260). The secret of life, he says, "lies not in its chemical basis, but in the logical and informational rules it exploits". Any new paradigm of the natural sciences must account for the origin of life and it likely to be cast in terms of information.

### **The Mind-body Problem**

If materialism rests on the belief that valid knowledge can only be derived from a logical interpretation of sensory experience, then we face the anomaly that each of us has a complex internal life somehow known to us other than through the senses. Furthermore each of us knows that everyone else has an internal life. The attribute of being conscious of subtle internal experience is *sentience*. The problem for materialism is to explain how the human body, a collection of apparently inert (dead) atoms and molecules, becomes sentient.

#### *Inconsequential or irrelevant anomalies*

These anomalies can be avoided by placing them outside the domain of science, thereby preserving materialism from their destabilizing effects.

### **The metaphysical anomaly**

Human internal experience has many dimensions: sensory-motor, instinctual, intellectual, sentimental, social, aesthetic, moral, spiritual and so on, none of which appear to be adequately described by measuring their physical correlates. Consider the widespread feeling that our lives have a *purpose*. Purpose has no place in a materialist account of the world. Events at the quantum level are fundamentally and unavoidably probabilistic. At the biological level, evolution depends on variation provided by random mutation. Teleological explanations are forbidden. And yet the human experience of life is that meaning and purpose are everything. A life without them is hardly worth living.

Western science sidesteps these issues by dividing human concerns into the physical and the metaphysical. Purpose is a metaphysical problem and not a valid concern for science. Indeed logical empiricists assert that metaphysical statements are not even meaningful. Such philosophical slight of hand has serious consequences. When all psychological and social problems are required to have a material cause then all effort is directed to material solutions. But contemporary societies are accumulating psychological and social problems faster than can be solved.

### **The logical paradox**

For most scientists engaged in what Kuhn would call *normal science*, materialism is a self-evident truth. However if we ask what evidence justifies materialism as the necessary and sufficient foundation for scientific endeavour, we find that no experience permitted by materialism can justify it. Materialism is not a fact but rather a prejudice which precedes experimentation. Even the neuro-philosopher Patricia Churchland admits, "We do our research as if materialism is a proven fact, but of course it isn't" (cited in Lewin, 1992, p.x).<sup>12</sup>

### *Illegitimate anomalies*

Illegitimate anomalies are those which would pose unacceptable threats to materialism if they were agreed to be legitimate and consequently must be rejected. Here we observe materialism as dogma, an idea beyond which one is not permitted to go. Two contemporary examples are opposition to homeopathy and to extrasensory perception (ESP). Note that our point here concerns not the efficacy of homeopathy and ESP but the response of orthodox materialism to them.

The first objection is that both defy the laws of physics. Homeopathy defies the *law of mass action* and ESP invokes faster than light communication and action at a distance. Note that this objection is characteristic of *normal science* – it denies evidence inconsistent with its accepted laws. The second objection is that neither phenomenon is experimentally verifiable. Here the dispute turns on the interpretation of statistics.

In a now famous episode, the French immunologist Jacques Benveniste submitted a paper to the journal *Nature* in 1987 in which he reported the water 'memory' effect in an immunological experiment. The work was attacked by the world famous sceptic and magician James Randi who found that the experiments were "statistically ill-controlled". Benveniste lost his prestigious position and funding – he was sacked. Again

the point here is not the efficacy of homeopathy but the fierce ideological opposition to it. Normal science protects its paradigms fiercely, making rational investigation very difficult.<sup>13</sup>

## The Emerging Paradigm

Any new paradigm of the natural sciences must present credible alternative accounts of the above anomalies before it will be accepted. In this section we describe the key features of subtle organicism and its approach to some of the above anomalies.

### *Organicism*

Organicism has biological origins but is more generally a philosophy concerned with the dynamic relationship between wholes and parts.

... complex wholes are inherently greater than the sum of their parts in the sense that the properties of each part are dependent upon the context of the part within the whole in which they operate. Thus when we try to explain how the whole system behaves, we have to talk about the context of the whole and cannot get away talking only about the parts. (Gilbert & Sarkar, 2000, p.2)

Organicism rejects the traditional view of logical empiricism<sup>14</sup> that all explanations of natural structures, whether 'living' or 'mechanical', are ultimately reducible to the laws of physics. Instead, as argued by the renowned evolutionary biologist Ernst Mayr, living systems have *emergent properties* that cannot be predicted, even in theory, from the most complete knowledge of their physical parts. Consequently biology is not reducible to physics – quite the contrary, biology requires its own philosophical foundation (or paradigm), organicism (Mayr, 1997).<sup>15</sup>

However, with respect to *emergent properties*, organicism has many hues. The authors of the above definition promote a materialist version of organicism – only chemical and physical processes are involved. They draw a distinction between materialist organicism and *holism*. The former is the accepted paradigm for embryology and developmental biology (Haraway, 1976). The latter they equate to *vitalism*. In this essay I have found it necessary to use the term *subtle organicism* in order to draw a distinction with both materialist organicism and vitalism.

To understand the vitalist distinction we need to define *autopoietic systems* (Maturana & Varela, 1980, p.13). Consider a robot built from many parts. An autopoietic robot would be one that contained all the information necessary to build the factories, to make the parts to repair and maintain itself without external guidance by humans. Autonomous biological structures, at all levels, (cells, organisms, social systems and ecosystems) are autopoietic systems in which structure, process and information are inseparably coupled to maintain the whole in equilibrium. They are "operationally closed", meaning that there are sufficient processes *within* the whole to maintain the whole. This coupling of structure and process is considered a rudimentary form of knowledge or cognition (Maturana, 1987, p.71).

According to Elisabet Sahtouris (another evolutionary biologist) both the earth and the universe are autopoietic systems and therefore living:

... the Earth meets the biological definition of a living entity as a self-creating autopoietic system, and that only limited aspects of its function – never its essential self-organization – may be usefully modelled by cybernetic systems ... Notice that calling the Earth alive, by definition, is more than proposing a new metaphor to replace mechanism. It is also different from proposing a Gaia hypothesis or a Gaia theory. There is nothing to be proven once we decide that Earth fits the autopoietic definition of life, as it simply revises our conceptualization from mechanism to organism. (Sahtouris, 1999)

Note that autopoiesis does not include growth or reproduction in its definition of life, though these are features of many living entities. Once one is persuaded of the ubiquity of autopoietic systems, "the model of a lifeless, mindless mechanical universe outside human experience" must be rejected in favour of a new scientific model, "a living, intelligent universe" (Sahtouris, 2009).

The distinction between organicism and vitalism turns on the issue of autopoiesis. According to vitalism, life arises from matter by the infusion of an external agent or soul which somehow slides in from the outside and slides out at death. From the organicist perspective, life is a unity, sufficient unto itself. Subtle organicism is a version of organicism which admits the possibility of non-material processes and it is to these we now turn.

#### *Subtle energy fields*

Fields are an important concept in organicism for they offer the means whereby the parts coordinate their activities with the whole (Harrington, 1996, p.117). Fields convey information and provide continuity where the parts are discrete. Morphogenetic fields were postulated in embryology around 100 years ago. They consist of chemical concentration gradients or electrostatic fields (Haraway, 1976, pp.58-59). However in this section we take a step towards explanations that are agnostic concerning materialism. Subtle energies can be understood as sources of information that structure matter but are themselves not necessarily material. The advantage of such a theory is that it might provide clues to the existence of uncontrolled variables which currently confound attempts to investigate subtle phenomena such as homeopathy and ESP (Tiller, 1993). Two well-known theories in this category are Rupert Sheldrake's *morphic fields* (1995) and Ervin Laszlo's *akashic field* (2007; Laszlo & Cullivan, 2008). Sheldrake has noted the similarity between the two ideas (1988, chapter 17).

#### *The matter-mind spectrum*

Morphic and akashic fields can be understood as sources of information to structure matter without any commitment to an ontological category such as mind. But the ideas are opposed by materialists because they invoke apparently non-physical processes. We are now getting close to the *subtle* in subtle organicism, and we take the next step by introducing a *substantive* theory of mind.

A satisfactory way to introduce mind into a description of the material universe is to postulate a matter-mind spectrum. Mind is some kind of substance or energy differing from matter only by degree. Physical matter is at the crude, energetically dense,

short wavelength end of the spectrum. Mind is at the subtle, energetically sparse, long wavelength end of the spectrum. Likewise human experience of the spectrum ranges from crude to subtle, determined by how accessible the experience is to human consciousness. Sensory experience of the physical world is easily accessible. Intellectual ideas range in difficulty and certain kinds of spiritual experience at the most subtle end of the spectrum are very difficult to grasp with ordinary consciousness. In other words the spectrum defines a gradation of both being and knowing.

The matter-mind spectrum has its echo in Western medieval philosophy as the *great chain of being* but has found new life due to the influence of Eastern philosophy (see, for example, Wilber, 1990). It is a component of Tantra and of Sarkar's cosmology.<sup>16</sup> It provides a scaffolding on which to build an understanding of subtle organicism and also the theory of microvita.

The matter-mind spectrum offers an account of several materialist anomalies. The strict dualism which materialism rejects is not a feature of the spectrum. Matter and mind differ only by degree. Consequently the spectrum approach dissolves the apparently sharp boundary between physics and metaphysics and between the natural sciences and the humanities. The categories still exist but can be understood as parts of a spectrum of reality. The natural sciences admit the categories of mind and consciousness. The humanities admit the categories of energy and elementary substance.

### *Consciousness*

As defined by the physicist Penrose, consciousness is the phenomenon whereby the very existence of the universe is made known. As defined by Sarkar, consciousness is the 'I' which knows that 'I exist' (Sarkar, 1993). The term *consciousness* is difficult for two reasons. First, because the referent of a word is assumed to be a *thing*, it is easy to forget that consciousness, by definition, is not an objective entity. Rather it has a subject/knower/observer/witness relationship to objectivities. Second, consciousness has several senses, all of which appear in this essay. 1) As defined by Penrose and Sarkar above, consciousness refers to the role of subject/knower/observer/witness. 2) Consciousness can also refer to the domain of experience of which a person is aware or conscious. Hence we talk about the conscious and unconscious minds and a person's social or political consciousness. 3) We also refer to collective consciousness, meaning the way a large group of people view the world and how that view changes over time. 4) Finally, in Sarkar's philosophy the universe is understood to be a conscious, living entity. Thus a distinction is made between the unit consciousness of a human being and the Cosmic Consciousness of the universe.

Recall that materialism treats consciousness as an epiphenomenon of matter. By comparison in Tantra (the tradition in which Sarkar situates himself), consciousness is a primary category. It is not derivative of energy and it has no origin to be explained. This approach to consciousness is not unknown among Western biologists. For example, the geneticist Sewall Wright (1889-1988) postulated consciousness to be an inherent property of elementary particles rather than an emergent property of biological complexity (1953).<sup>17</sup>

Physicists have proved much more willing to accept consciousness as integral to any description of the universe. Max Planck:

I regard consciousness as fundamental. I regard matter as derivative from consciousness. We cannot get behind consciousness. Everything that we talk about, everything that we regard as existing, postulates consciousness. (quoted in *The Observer*, 25 January, 1931)

More recently, the celebrated physicist John Wheeler, who coined the term *black hole*, devised an illustration in which the universe is represented as a large letter U. One arm of the U is endowed with an eye intently observing the other arm which represents the informational aspect of reality. The universe is both observer and observed, conscious and introspective (Wheeler, 1980).<sup>18</sup> No reality can be observed outside of consciousness.

Organicists traditionally regard consciousness as an emergent property of the complex structure of parts that make a biological whole. Yet we have just described consciousness as primary and non-derivative. Is this not a contradiction? The contradiction arises due to the multiple meanings of the word *consciousness*. In the sense of subject/knower/observer/witness, consciousness is primary and non-derivative. Consciousness as the *domain* of which a subject is aware is an emergent property – the more complex the material and mental structure of the whole, the more extended and subtle the domain of consciousness.

## Resistance to Paradigm Change

In this section we explore resistance to paradigm change. The members of a scientific community are bound by a common paradigm, a set of shared theories, values and beliefs about their discipline. The tension between preserving and over-throwing paradigms infuses scientific endeavour with much dynamism. From a cognitive perspective, a paradigm is a shared conceptual structure encoded in the minds of a community of scientists and consequently a cognitive account of paradigms is necessary if we are to understand the scientific process.

The scientific community generally rejected Kuhn in favour of logical empiricism and Popper's critical rationalism (Wettersten, 2007) because concepts such as *gestalt shift* and *incommensurability* (the inability to compare a pre-revolutionary with a post-revolutionary paradigm) invoked cognitive processes that, at the time, had no empirical support and furthermore appeared to place scientific debate beyond the reach of logical analysis. Kuhn emphasized the *extralogical* (Haraway, 1976, p.205) dimension of scientific investigation and was accused of *irrationality* and *relativism*. However since the publication of *The Structure of Scientific Revolutions*, great advances in brain imaging, neural networks and cognitive psychology have provided new support for Kuhn's theory of scientific concepts.

Andersen et al. (2006) provide a significant reinterpretation of Kuhn using the tools of *frame theory*, which itself grew out of the Roschian revolution in psychology in the 1970s and 80s. Frame theory provides a model of how the brain works with complexly structured concepts. A paradigm is represented in the brain as a taxonomic tree or concept hierarchy consisting of branches and nodes (Andersen et al., 2006, p.13). At the base of the tree is a single node encapsulating all categories and entities recognized by the paradigm. This parent node branches into child nodes and so on

down the tree, each layer representing finer and finer subsidiary categories.<sup>19</sup> Ultimately each of the many branches ends in a leaf or single conceptual entity. Similarity and dissimilarity between concepts is determined by the path distance between nodes (Andersen et al., 2006, pp.106-107).

Frame theory enjoys empirical support and appears to be "robust across modern human cultures" (Andersen et al., 2006, p.14). The benefit of applying frame theory to paradigms is that it suggests a new way to understand scientific revolutions. An anomaly violates the structure of a concept tree and, if accepted as legitimate, it indicates something wrong with a community's model of the world (Andersen et al., 2006, pp.165, 172).

The severity of an anomaly depends on the locus of the violation. The higher up the tree (closer to the trunk), the more fundamental the anomaly and the more difficult the reconciliation (Andersen et al., 2006, p.167). Andersen and colleagues believe that Kuhn's distinction between 'normal' science and 'revolutionary' science is best interpreted in terms of the severity of the tree reconstruction required to achieve reconciliation. If the discrepancy is small (involving only the rearrangement of a few leaf nodes) the community will make the adjustment and 'normal' science continues. However a discrepancy high in the tree will be difficult to reconcile and a scientific 'revolution' must ensue. Incommensurability is the natural consequence of restructuring a concept tree (Andersen et al., 2006, pp.165-166). The words for ontological terms may persist but their meanings change due to a change of context in the tree.

Here lies a fascinating tension. If we reject Feyerabend's anarchistic, "anything goes" interpretation of science (see Feyerabend, 1975)<sup>20</sup> and sidestep the vexed issue of scientific realism,<sup>21</sup> then science claims superiority over religion because *ultimately* it allows experience to overthrow theory and doctrine. Furthermore there is an explicit commitment to public discussion of anomalies and their reconciliation. Yet 'normal' science resists paradigm change until it cannot be avoided. Indeed says Kuhn, many scientists do not make the change – they simply retire and die. Andersen et al. tell us that such resistance is not pure bloody-mindedness. The reconstruction of a concept tree involves neuroplasticity and the expenditure of much cognitive energy (Doidge, 2007). Consequently one cannot understand the dynamics of science without acknowledging the neural substrate in which its logic is played out.

The struggle by biologists of the late nineteenth and early twentieth centuries to reject mechanism and develop organicism was a Kuhnian paradigm shift in the biological sciences (Haraway, 1976, p.204). Here we are concerned with the much greater transition in the natural sciences from materialism to subtle organicism. These two paradigms can be represented as concept trees as in Figures 1 and 2. It must be admitted immediately that the two paradigms might have been represented in many different ways – the trees shown are not necessarily the most defensible and no attempt has been made to represent frames with attribute-value pairs. The trees have been constructed with a view to highlight the difficulties inherent in a paradigm shift from materialism to subtle organicism.

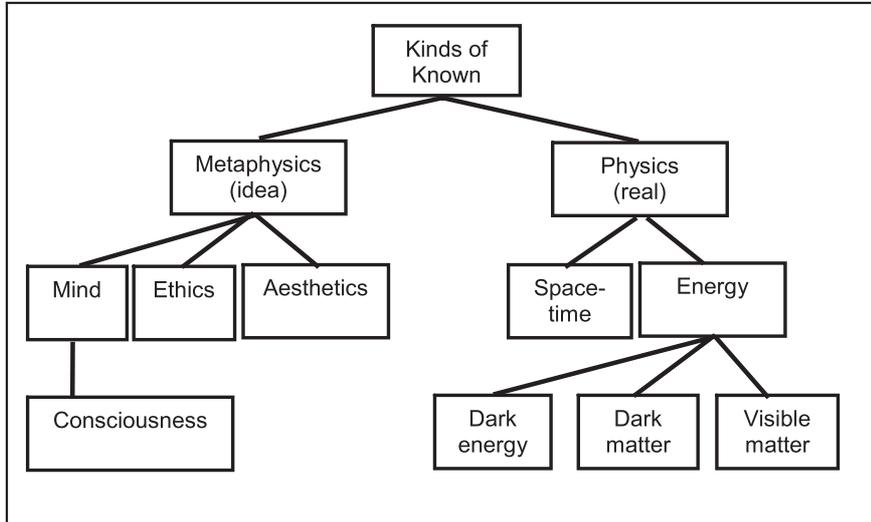


Figure 1. A concept tree representing traditional materialism

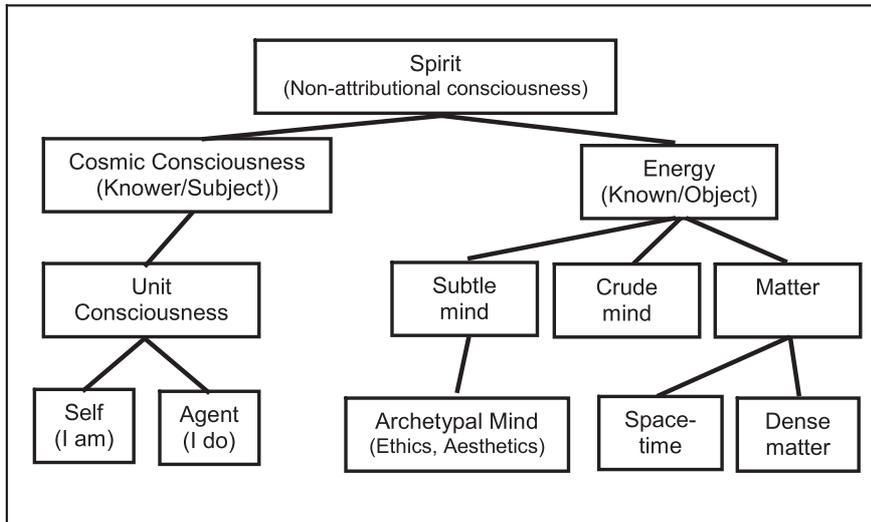


Figure 2. A concept tree representing subtle organicism

Just four of the major discrepancies between the two trees will be noted:

1. Consciousness in the materialist tree is a leaf node indicating that it is a sub-subcategory or derivative of more fundamental categories. In the subtle organicist tree, consciousness is the primary node or trunk. The shifting of a leaf node to primary node is as fundamental a change in a concept hierarchy as one can make and gives rise to a severe example of incommensurability further compounded by the various meanings of the word *consciousness* within subtle organicism.

2. There is a partial symmetry between the trees. The physics/metaphysics divide (in the materialist tree) corresponds (in the subtle organicist tree) to the energy node splitting into matter and mind (crude and subtle). Yet the latter divide is not so fundamental, not so high in the tree. Indeed the boundary between physics (the natural sciences) and metaphysics (the humanities) is somewhat dissolved in subtle organicism. They are part of a continuum.
3. Mind in the subtle organicist tree is substantive – some kind of energy. In the materialist tree, mind is an abstract symbol or linguistic artifice. Here is another source of incommensurability.
4. In the materialist tree, ethics and aesthetics are purely metaphysical constructions. In subtle organicism, ethics and aesthetics are integral to the structure and processes of the universe. This difference between the two trees is possibly the least understood and most controversial. It will not be pursued in this essay (but see Towsey, 2010).

In short the concept trees in Figures 1 and 2 illustrate that the transition from materialism to subtle organicism cannot proceed without a fundamental "reconstruction of the field from new fundamentals" (Preston, 2008, p.52). History tells us that such change does not happen overnight and therefore any expectation of an imminent transition from materialism to subtle organicism is misguided. On the other hand, change when it comes can be rapid. After an accumulation of anomalies over some decades, Einstein's 1905 papers turned physics on its head within a few years.

To conclude, no account of science can ignore its cognitive dimension. Socio-economic and social constructivist theories have dominated accounts of science and social change over the past 100 years. However as pointed out by Andersen et al. (2006), a complete account of science "requires a mix of social or historical factors with cognitive factors ... [and] renewed attention to its cognitive structure" (p.168).

### The Theory of Microvita

The theory of microvita makes at least three contributions to subtle organicism: it provides a helpful account of mind using metaphors well established in physics; it accounts for some additional materialist anomalies; and it links the scientific method to Sarkar's theory of cognitive evolution.

Two previous papers in the academic literature describe the theory of microvita – the first from the perspective of the natural sciences (Towsey & Ghista, 1995), the second from the perspective of the social sciences (Bussey, 2010b). While it is clear that the microvita discourses address issues of fundamental science, the ideas are difficult and not presented in a way designed to appeal to a Western scientific audience. Our interest here is only to introduce those aspects that make an obvious contribution to the emergence of subtle organicism.

Sarkar postulates that, from a particle point of view, the fundamental entities of the physical universe are *microvita* (singular *microvita*) derived from the Latin, 'small life'. A microvita is "the minutest entity". It has no internal structure – it "requires space in theory but not in the realm of physicality" (Sarkar, 1991, p.58).<sup>22</sup> Although billions of microvita are said to coalesce to form a physical particle such as

a proton, a microvita itself is not pure matter nor pure idea but an intermediate form, a "silver lining", between the two.

Microvita are born and they die. We may interpret this metaphorically to mean that microvita are in a continual state of flux, that is, continually emerging from and returning to the vacuum state (the aether).<sup>23</sup> The reference to birth and death reinforces the notion that life has its basis in the subatomic realm. Indeed throughout the microvita discourses Sarkar uses the language of life where contemporary scientists would use the language of physics.

There is a continual exchange between matter and microvita. "Microvita are the initial stage of matter... microvita are transmuted into matter and matter is transmuted into microvita" (Sarkar, 1991, p.67). Thus there is a two-way flux of microvita:

aetherial space  $\longleftrightarrow$  microvita  $\longleftrightarrow$  physical particles.

Microvita are responsible for the structural integrity of all physical entities and life forms. Carbon atoms, for example, and "all other kinds of atoms are the creation of microvita"; "... when billions of microvita get solidified, a carbon atom is formed". Differences between atoms are due to differences in number, denomination and arrangement of the constituent microvita (Sarkar, 1991, pp.44-45).

I believe these ideas to be Sarkar's account of the quantum vacuum and virtual particles. Virtual particles continually emerge from and return to the vacuum and they interact with real particles. The following equation makes the link to microvita apparent:<sup>24</sup>

quantum vacuum  $\longleftrightarrow$  virtual particles  $\longleftrightarrow$  physical particles.

#### *Mind – as above, so below*

Sarkar now takes a significant step – the relationships which exist between matter, microvita and aetherial space in the physical arena are extended to the psychic arena, the world of mind. In fact, they apply to the entire spectrum of energy and substance, from the crudest to the most subtle. We may interpret this step as an invocation of the *principle of self-similarity*. We can express these ideas in a spectrum of interactions, represented below for each end of the spectrum:

aetherial space  $\longleftrightarrow$  crude microvita  $\longleftrightarrow$  physical structures

psychic space  $\longleftrightarrow$  subtle microvita  $\longleftrightarrow$  psychic structures.

All these different psychic and physical structures coordinate their activities resulting in a universe that displays *coherence* (McTaggart, 2002, p.121). Thus we find implicit in microvita theory the principles of self-similarity and coherence which Laszlo considers essential for any understanding of the universe.

#### **The structure of ideas**

A logical consequence of the substantive theory of mind is that ideas (the content of mind) are also substantive structures. Consequently the organicist whole-parts relationship also applies to the world of mind. Indeed it is significant that in order to elucidate the whole-parts relationship, organicists use linguistic metaphors (see Gilbert & Sarkar, 2000). The meaning of a word in a sentence cannot be understood without ref-

erence to the whole sentence and yet the sentence itself is more than the sum of the individual word meanings. Language is a suitable metaphor for organicism because the ideas expressed by language have an organicist construction.<sup>25</sup>

#### *Microvita and the anomalies of materialism*

The theory of microvita offers an account of the materialist anomalies. We refer here only to those that Sarkar addresses explicitly.

#### **Atom has mind**

In microvita theory an atom is composed of billions of microvita. (We see here yet another level of relationship between parts and wholes suggesting that *organism* is a suitable metaphor for the atom.) Some of them have sensory attributes and can therefore be detected directly through the sense organs or indirectly through instruments. But some have psychic propensities and these constitute the subtle part of an atom, its mind. This idea is not new and is a continuing strand in the organicist philosophies of the mathematician Alfred Whitehead (1966) and the evolutionist Sewall Wright:

The only satisfactory solution ... would seem to be that mind is universal, present not only in all organisms and in their cells but in their molecules, atoms and elementary particles. (quoted in Birch, 1990, p.24)

More recently Charles Birch, former professor of biology at the University of New South Wales, summed up the idea:

There is but one theory, known to me, that casts any positive light on the ability of brain cells to furnish us with feelings. It is that brain cells can feel! What gives brain cells feelings? It is by the same logic that we may say – their molecules. And so on down the line to those individuals we call electrons, protons and the like. The theory is that things that feel are made of things that feel. (1990, p.32)

In other words, subatomic particles have psychic propensities which are the antecedents of feelings and sentiments in biological organisms. Just as an electron has electric charge, it also has psychic propensities that, in aggregate, contribute to mind. As Sarkar puts it, atoms have a crude part and a subtle part. The subtle parts are the antecedent of human mind – if we wish to understand them we have to study those parts of human psychology to which they contribute (1991, p.133).

If atoms have mind, why do we not recognize it – in a rock for example? Here we invoke the metaphor of a magnetised iron bar. Although each iron atom produces a small magnetic field, it is not until all atoms orient in the same direction that a macroscopic field is apparent. In human beings, mind is an emergent property dependent on the coordinated structure/metabolism of trillions of constituent cells.<sup>26</sup>

Embedding mind in the sub-atomic world allows us to address two more materialist anomalies: quantum uncertainty and the origin of life.

#### **Quantum Uncertainty**

In an apparent reference to quantum uncertainty, Sarkar notes: "Most of the atomic research done until now has been done on the basis of the guessing method because

different stages of the atom and different constituent parts of the atom do not come under direct perception – they come [only] within the arena of human concept" (1991, p.133). In Sarkar's theory, atomic structure is due to billions of participating microvita, only some of which are detected with physical apparatus. The rest are too subtle to observe physically but nevertheless have an influence on the outcome of observations. Clearly this is a reference to the hidden variables debate – quantum probabilities in Sarkar's theory *are* a product of ignorance and not intrinsic to quantum processes.

### **The origin of life**

Recall Paul Davies' proposal for new laws of information and informational forces. Microvita can be understood as organizing principles (information bits) integrated into the structure of atoms. Those which are non-physical nevertheless contribute to the building and maintenance of organic structures against the disintegrating influence of entropy. They could also be considered the source of Sheldrake's morphic fields.

### **A New Scientific Method?**

#### *From philosophy to science*

The early twentieth century paradigm shift from an absolute, mechanical universe to a relativistic, probabilistic universe was indeed a revolution. Fundamental assumptions, such as realism and cause-and-effect, had to be abandoned. Even the great Einstein could not make some of the required cognitive adjustments. Yet he remained a scientist. Which begs the question – what must remain unscathed in a fundamental revolution of the natural sciences? Must the scientific method itself change? As Kuhn recognized, a paradigm is not just a representation of reality, it is also a *particular way of doing science* (Preston, 2008, p.24). In this section we ask the question – in what ways might the scientific method change given a change in the paradigm of the natural sciences?

The practice of Western empirical-analytic science involves disciplined observation to discover patterns of association or cause and effect. A successful outcome reduces uncertainty in our interactions with Nature. Scientists who have embraced the discipline fear that, by admitting the mind and internal worlds as legitimate domains of study, they will be obliged to let go of measurement and rigour, from which it is but a short slide back to superstition and religion. It is a legitimate fear.

The Western scientific discipline rests on three inviolable principles that must survive any paradigm shift we can presently contemplate:

- Experience must take precedence over theory.
- Experience must be measureable or countable.
- Experience must be validated by as many persons as possible.

Note that none of these principles (even the second) necessarily restricts itself to sensory experience of the material world. But is it really possible to extend this methodological discipline to embrace the intangible world of mind? The answer, I suggest, is 'eventually but not yet'. Let us approach this question by a consideration of the above principles.

### Experience must take precedence over theory

Scientists like to claim that they arrive at theories through observation and experimentation. Experience precedes theory. In practice, as we have already noted, the relationship is more complex. Avoiding the issue of scientific realism, let us accept that theory stimulates experimentation which stimulates more theory. If the cycle is broken for want of a satisfactory theory, or want of sufficient experimental results, science stagnates. Western materialism cannot produce a science of mind because it has neither a satisfactory theory nor the appropriate experimental methods.

Microvita theory implies that humans can extend their exploration of the universe into the currently subjective world of mind. But what kinds of experience are relevant to this exploration and could they be reproducible? Sarkar deals with this issue in the following passages:

...atoms have two parts – the cruder part and the subtler part... The subtler part of atoms has not been investigated. For research into the subtler part of atoms, psycho-spiritual practice is needed... many great things can be achieved by using the subtler part of atoms. This is yet to be seen. When research into the crude and the subtle parts of atoms proceeds together, then only will there be great benefit for the entire creation. (1991, p.132)

Microvita research can be done in physical, chemical, medical and psychological laboratories. For microvita research, you will have to study human psychology thoroughly. (1991, p.133)

With the help of non-carbonic pabula they [human beings] will sharpen their psychic penetration within inter- and intra-atomic and molecular space. (1991, p.23) [*Non-carbonic pabula* is a term Sarkar uses to describe intellectual and spiritual sustenance for the mind.]

I think, by dint of our spiritual sadhana [meditation and other mental disciplines that are part of the tradition of Tantra], rather our physico-psycho-spiritual sadhana, our minds will develop in all strata, and the power of conception, the power of conceiving, will also develop, and with that developed conceiving power, we will know all the secrets of these microvita. (1991, p.5)

A consistent theme throughout the microvita discourses is that the scientist must acquire a "power of conceiving". I suggest that this power can be understood as a highly developed *intuition* because the practices Sarkar prescribes to develop the power of conceiving he describes elsewhere as *intuitional science* (Sarkar, 1992).

Intuition is an ability to obtain an immediate insight or understanding that apparently bypasses conscious sensation and reasoning. It has a number of characteristics. First, it appears to play a significant role in many aspects of human life, including artistic creativity, personal relationships and problem solving. It certainly plays a role in the formulation of scientific models and hypotheses. Second, it appears to emerge from beyond the conscious mind as though it is a power expressed through us but not by us.<sup>27</sup> Third, intuitional insights emerge best in a still mind. Empathy, one kind of intuition, does not blossom in an agitated mind. Everyone has the capacity for intuition but it is usually frustrated by incessant demands on time and the senses. Meditation is a well known way to focus attention and to strengthen intuition.

The development of an enhanced intuition as proposed by Sarkar would probably involve a change in the normal state of human consciousness. Strange as this may seem, it would not necessarily be the first time such a change has occurred within the brief span of human history. The American psychologist Julian Jayne (1920–1997) has argued that people prior to 3,000 years ago did not possess the unified, introspective mind-space that we consider normal today. Rather than identifying thoughts with self (at least what we moderns understand as self), they interpreted them as voices of the gods. Today we might say their behaviour was directed by auditory hallucinations. Jayne argued that the change from this mode of consciousness (which he called the *bicameral mind*) to what we consider 'normal' consciousness (self-identification with internal mental states) occurred over a period of centuries about three thousand years ago and was catalysed by the emergence of metaphorical language and writing (Jayne, 1990).<sup>28 29</sup>

Today we find such a state of mind hard to imagine. Yet we possess another kind of bicameral mind, one in which intuition is not integrated into our mind space but rather appears to operate externally and independently. The development of a microvita science will require transcending our contemporary bicameral mind to find a new way to engage the world intuitively. If language and writing catalysed the previous transition in consciousness, what might trigger the next transition? Climate change? The internet?<sup>30</sup>

### **Experience must be measureable**

Measurement is the foundation of empirical-analytic science, yet it is a source of both strength and weakness. So much of what is important in human life cannot be measured. "... values, life meanings, purposes and qualities slip through science like sea slips through the nets of fishermen" (Smith, 1976, quoted in Wilber, 1990, p.27). Nevertheless it is difficult to see how one can discover patterns in nature without counting – for without counting, statistics is impossible; and without statistics, induction is impossible; and without induction how can one validly assert the existence of a pattern? The logical interpretation of measureable experience must remain a defining feature of empirical-analytic science.

Sarkar's exposition of a new kind of science makes three important claims. The first is a motivating claim – that the world of the atom is not purely physical and therefore a complete account requires 'observing' its non-physical components. Second, in order to 'observe' the non-physical components scientists will have to develop a new mode of knowing appropriate to the task. In Wilber's terminology this new mode appears to lie somewhere between the "eye of reason" and the "eye of contemplation" – let us call it the *eye of intuition*. Third, all experience is mediated by microvita which are discrete<sup>31</sup> and countable. Thus experience mediated by the 'eye of intuition' is amenable to mathematical treatment. For example, mind could be dealt with mathematically as a multi-dimensional space, just as the material universe is so described.<sup>32</sup>

It is apparent that Sarkar's proposal for a more subtle science does not fit comfortably into Wilber's schematic of five modes of knowing as described in *Eye to Eye* (Wilber, 1990, p.175). First Sarkar's proposal introduces a new kind of knowing or

subject-object relationship – a subtle portion of mind (subject) uses its eye of intuition to observe a less subtle portion of mind (the object). Second Sarkar implies that a mathematical treatment of the objectivized mind is possible whereas in Wilber's schema mathematics is used only by the eye of reason on sensory experience (Wilber, 1990, p.174). Sarkar's proposal opens the way for the eye of reason to explore mind using all three modes of knowing, mandalic, hermeneutic *and* analytic.

### **Experience must be validated**

Patterns in the natural world are not self-evident. They hide behind the relativity of time, space and person. Events take on a different guise depending on how, when and where we observe them. Scientists have developed ways to circumvent the relativities of time and space but the relativity of person remains problematic and is the focus of the post-modern critique of Western science. Science attempts to circumvent the relativity of person using *consensual validation*, that is, multiple persons independently repeat the same experiment. But this is an imperfect solution because every observer is a multiplicity of persons – an individual but also the member of a family, a community, a nation, a class, a culture and a gender. In other words, the person relativity operates on many different scales. So it is that a community of male scientists produced a theory of human evolution in which men played the dominant role.<sup>33</sup>

Despite its shortcomings, consensual validation remains the best defence we currently have against dogma and declarations of divine revelation. Its success requires scientists to be well trained – to learn their discipline's paradigm and grow the necessary brain maps. To achieve this students pursue two strands of study. They learn theory from books and lectures, and sensory-motor skills in laboratories. Both strands are essential.

The implication of Sarkar's theory is that a two-strand education will not, in future, be enough. A third strand will be required to develop a "power of conceiving". Meditation will be indispensable. Students will likely sit in meditation halls dedicated to the purpose of learning the visualizations and auto-suggestions relevant to their discipline. They will be taught to withdraw their minds from external distractions and to focus their powers of concentration. Using appropriate imagery, their minds will be projected into inter-molecular spaces or into more subtle psychic spaces. One can imagine that just as the previous two centuries were dominated by the discovery of the chemical elements, so the coming centuries will be dominated by the discovery of elemental psychic particles or microvita. Once a new particle is discovered, students will learn how to deploy their own minds to obtain the same experience. Such techniques will be useful not only in physics. Sarkar foresees applications in chemistry, engineering, medicine and agriculture (Sarkar, 1991, pp.35-36).

In a comment on the education system required to promote a science of microvita, Sarkar suggests that all levels of the curriculum from kindergarten to post-graduate should teach the philosophy of Neohumanism (Sarkar, 1982) and the eight practices of Astaunga Yoga (Sarkar, 1991, p.51).<sup>34</sup> These include ethics, regulation of breath, body postures, withdrawal of mind from the senses, concentration and meditation.

To conclude, we can interpret Sarkar's proposal for a science of microvita as a synthesis of East and West. The contribution of the West is clear – it brings a rigorous

three-part methodology of observation, theory and validation. In particular it brings the extraordinary development of logic and mathematics by which experience can be formalized. And the East? It brings a dramatic expansion in the domain of legitimate experience and, more importantly, the disciplined methodology by which subtle experience can be obtained. It took centuries to develop today's scientific method and it may take many more years before the synthesis of East and West settles into an integrated methodology. But there is surely a trend – the cutting edge of science is becoming more psychic than physical.

## Two Cultures – Science and the Humanities

In this section our focus shifts to the larger time-scale, in which paradigm struggle in the natural sciences is just one small step in the evolution of human cognition. To motivate this larger perspective, we begin with a problem identified in 1959 by the research chemist, civil servant and novelist C. P. Snow who argued that modern intellectual life had split into two cultures, one informed by the sciences and the other by the humanities.<sup>35</sup> A breakdown in communication between them represented a serious social problem, even a threat to Western civilization. A decade later when I was a student, *Two Cultures* still generated discussion. Today the divide has hardened into an ideological struggle between crass materialism versus a subtle culture; between neo-liberal economics and community; and between a mechanistic universe and a living one.

Subtle organicism and the theory of microvita offer a single philosophical framework to span the material, psychological, social, ethical and psycho-spiritual lives of human beings. Which raises the question – can an all-inclusive philosophy dissolve Snow's divide and bring about an integral or holistic culture?

We approach this question by returning to the matter-mind spectrum that underlies the great chain of being. We may divide the spectrum at two places, one marking the divide between matter and mind, the other between object and subject. At the present stage of human evolution these divides are close, implying that mind is subject to the objective world of matter. But the two divides are quite different. The former is an ontological divide between existential categories. The latter is an epistemological divide between knower and known.<sup>36</sup> Object is that part of the spectrum (on the crude side of the divide) of which a person is conscious. Subject is that subtler part of the spectrum of which a person is not conscious but which contributes to the structure of self.

Correspondingly there are two sides to the story of evolution, the structural and the cognitive. On the structural side there is increasing complexity as parts become wholes – billions of atoms become a living cell, billions of cells become an organism (eventually human) and billions of humans become (eventually) a planetary society. On the cognitive side, each synthetic or integrative step is accompanied by a *shift in the subject-object divide*. At each step, the light of consciousness shines into the 'near' portion of the subject spectrum so that a small part of the proximal subtle mind which was subject now becomes object – the domain of conscious mind expands; additional and more powerful modes of knowing become available. Sarkar describes this process

as Supreme Synthetic Subjective Appropriation (SSSA). It is his ideological response to materialism, and it is pertinent to our discussion of Western science.

If materialism is rejected, what should be the desideratum of human life? The supreme goal should be the subtlest entity. Human beings have to move towards this supreme goal. Your approach should be internal, subjective, but at the same time you have to maintain an adjustment with this world of objectivities. In the process of adjustment there is a subject and an object, and in the next stage the subject becomes the object and a new subject arises. In the following stage the new subject becomes the object. (Sarkar, 1988)

SSSA is Sarkar's account of human evolution and history from the perspective of subject and consciousness. It complements his theory of the social cycle (Sarkar, 1998; see also Inayatullah, 1999). The process of SSSA exposes a nested hierarchy of subjects which Sarkar illustrates using the idea of a school administration.

If you think of your schoolteacher, your schoolteacher is your subjectivity. You think that your schoolteacher is seeing everything. The schoolteacher thinks that the school inspector is seeing everything, so the school inspector becomes the subjectivity. The school inspector thinks that the director of public instruction is seeing everything, so the director becomes the subjectivity and the school inspector becomes the objectivity. (Sarkar, 1988)

The term *appropriation* in SSSA references the work of Whitehead and William James (see Wilber, 1990, chapters 6 and 10 respectively). In Whitehead's concept of *prehension*, for example, an entity becomes subject by appropriating other entities that come before it. In SSSA those preceding entities are the parts which make the whole. In other words by appropriating the parts, the whole gradually becomes subject to the parts – and the parts which were subject now become object.

Incorporating SSSA into subtle organicism allows us to deal with two more materialist anomalies, the *logical paradox* and *purpose*. Recall, the logical paradox concerns the inability to find a justification for materialism within the constraints imposed by materialism. SSSA accommodates the paradox because the discipline imposed by a paradigm at one level finds its justification in the paradigm of the next emerging level. A teacher's paradigm (his/her pedagogy) finds its justification in the existence of school inspectors and directors of education whose domain encompasses more than that of the teacher. Note that by this logic, materialism is certainly a legitimate paradigm for a restricted number of purely physical scientific puzzles.

SSSA introduces purpose into subtle organicism because meaning lies in the subject. The inevitable consequence of a succession of parts becoming wholes is to arrive at the "subtlest entity", the Supreme Subjective State.<sup>37</sup> This movement gives meaning to all life and is the foundation of Sarkar's social philosophy, *Prout*. Individuals and societies, by gradual steps, move from the crude to the subtle and from the selfish to the collective welfare. In this view, all scientific and intellectual discoveries, all kinds of social and economic achievement are only considered *progress* to the extent they encourage the synthetic flow of life from crude to subtle.

*SSSA in Human History*

According to SSSA, human biological and cultural evolution is characterised by a succession of synthetic steps both structural and cognitive. The transition postulated by Jayne around 3,000 years ago was probably catalysed by the development of writing, an information technology revolution every bit as significant as our modern equivalent.<sup>38</sup> On the structural side, writing enabled much larger groupings of humans to act as a cohesive unit thereby helping humanity to cope with the vicissitudes of nature.<sup>39</sup> On the cognitive side, human consciousness took a quantum step. The bicameral mind divided between subject (voices in the head) and object became, from our modern perspective, integral or unicameral. The two transitions were inextricably linked.<sup>40</sup>

Three thousand years later we are confronted with another information revolution whose structural consequence is *globalization*. But, just as before, there is a cognitive side. The contemporary mind is divided in at least two respects. First, as already noted, the faculty of intuition is not properly integrated into the modern psyche – it is our contemporary equivalent of 'voices in the head'. Second, the two cultures recognized by Snow, now locked in ideological struggle, are the consequence of a divided mind – one looking back to the known world of matter, the other looking forward to the subtle but less well differentiated world of subject. The success of globalization depends as much on a cognitive metamorphosis as on the obvious political and economic factors.

In Sarkar's view science plays a crucial role in SSSA. First, science is the means by which humans "maintain an adjustment with the world of objectivities". It has created the technology to make globalization possible. Second, science changes the human race. Material science has wrought biological and psychic changes in humans thereby exposing the existence of a more subtle subject and arousing interest in psycho-spiritual practices (Sarkar, 1978).<sup>41</sup> Third, the ensuing development of a more subtle science of microvita is now required to solve the social problems created by globalization. As Sarkar puts it, without a more subtle science "many of the problems in modern society will not be solved in a nice way". The knowledge acquired by this more subtle science will not in itself be wisdom, but it "will help us much in attaining the stage of *paravidya* [wisdom or spiritual knowledge]" (1991, p.52). "Microvita is the inner secret of life, the inner secret of vital progress in the three fields of physicality, psyche and spirituality. This theory of microvita must not be neglected or ignored" (1991, p.42).

So returning to our earlier question: can an all-embracing philosophy of science dissolve Snow's cultural divide? The answer is surely yes – but only temporarily! For with each integrative step, the subject-object divide *dissolves* but then *relocates* to create a new subject in which new meanings reside. Humans will always be attracted to the subtle but uncertain world of subject, drawn irresistibly by intellectual, aesthetic, ethical, egalitarian and Neohumanist impulses (Towsey, 2010). The mystery and the spiritual promise of the subtle unknown will continue to attract the attention of artists, poets, musicians and novelists who will continue to express ever more subtle experiences that elude the eye of an analytical science.

### *Concluding thoughts*

This essay began with the premise that materialism is accumulating anomalies which make it vulnerable to a challenge from a new philosophy of the natural sciences. The character of those anomalies invites a challenge from a philosophy such as subtle organicism. We explored the main conceptual features of subtle organicism and the contribution of microvita theory. To replace materialism, subtle organicism will need to overcome theoretical and practical difficulties. The former demand a major reconstruction of our model of the natural world. The latter demand the honing of new cognitive faculties. These difficulties are interwoven because a more subtle paradigm requires more subtle cognitive faculties to sustain it.

The debate between materialism and subtle organicism goes back to the nineteenth century. Three waves of organicism can be discerned, each following an apparent triumph of materialism and machine (Harrington, 1996, p.207). The first wave appeared after the terrible destruction of World War One. It was a global movement (the English spokesperson was Whitehead) but German biologists in particular developed a theory of organicism that gradually distinguished itself from vitalism. The second wave (the New Age generation of the 1960s) appeared in the shadow of the atomic bomb and embraced the larger ecological perspective. The third wave followed the Cold War whose ending symbolized the defeat of the communist machine by the capitalist machine. Its contemporary spokespersons are biologists such as James Lovelock, Rupert Sheldrake and Elisabet Sahtouris.

In each wave, the metaphors changed somewhat but the fundamental issue remained the same – materialism and the mechanist world view are antithetical not just to humans but to life itself. As long as materialism dominates the sciences, the challenge posed by subtle organicism in whatever guise will not go away. Whether the third wave has enough dynamism to replace materialism or whether a fourth wave will be required only the future will tell. But there is much more at stake here than philosophy of science. The future of globalization and indeed of the human race is dependent on the outcome.

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## Notes

1. Monism is the philosophical view that various apparently distinct categories can be reduced to one category. It usually stands in contrast to dualism, the view that they can or should only be reduced to two.
2. The measurement problem arises in quantum physics and is regarded by some as a fundamental anomaly in Western science. A measurement on a physical system is not complete until it is registered in the mind of a conscious observer. Consequently the state of the system cannot be known until the moment of conscious observation. That is, the observer is not just a passive witness but has a causal role in determining what is observed. See Greene (2004, pp. 91-95, 201) for a discussion of these and associated questions.
3. <http://www.sheldrake.org/homepage.html>
4. <http://www.candacepert.com/> Molecules of emotion
5. Sahtouris understands life as an essential expression of the universe not, as materialists would have us believe, an accident. Matter/energy arranges itself into living forms on multiple scales from the super-galactic and galactic down to bacterial life-forms on planets such as earth. See <http://www.ratical.org/LifeWeb/Erthdnce/chapter21.html>. For links to her other work see [http://en.wikipedia.org/wiki/Elisabet\\_Sahtouris](http://en.wikipedia.org/wiki/Elisabet_Sahtouris)
6. Much of Sarkar's work was originally presented in discourses. The existing book on microvita (1991) is actually a compilation of transcriptions of talks, both formal and informal. Audio recordings exist for the former and therefore the transcriptions are reliable. For the latter, there now exist only notes taken by persons present and thus the record of these talks must be considered less reliable.
7. See, <http://www.answers.com/topic/organicism>. The slogan "the whole is greater than the sum of the parts" is attributed to the Austrian philosopher Ehrenfels in 1890 (Harrington, 1996, p. 28) As a biological doctrine, organicists believe that the central problem of biology is *form*. Form does not mean just a static structure. It refers to the dynamic development of anatomical structure from zygote to adult.
8. Organicism defines itself by making a number of distinctions, for example: machine versus gestalt; mechanism versus organism; reductionism versus holism. Charles Birch (1990) understands these dichotomies as defining modernism versus postmodernism. However postmodernism makes no commitment to any *-ism* and ought not to be aligned to organicism. Modernism is defined by a belief in "progress through rationalization, secularization, technological innovation, etc." (Harrington, 1996, p. 143).
9. This is the so-called Copenhagen Interpretation of wave-particle dualism. The Copenhagen Interpretation side-steps the wave-particle puzzle but thereby introduces another puzzle already mentioned – the *measurement problem*.
10. As is well known, Einstein famously said, "I... am convinced that [God] does not throw dice". Not so well known is Niels Bohr's reply: "Einstein, stop telling God what to do!" (Isaacson, 2007, p. 326).
11. See Greene (2004, Chapter 4, "Entangling Space") for further discussion. The assertion that quantum events are inherently probabilistic requires a caveat – they appear so given today's apparatus and theories. But it is a mistake to assume that today's science has reached the limits of reality. Quantum uncertainty is better understood as a way of

- describing our current state of knowledge and not as some fundamental truth about the universe. See Greene, pp. 99 and 206 for discussion of these issues.
12. As quoted by Lewin (1992). Churchland goes on to acknowledge that although she does not believe in Cartesian dualism, "we cannot claim to have ruled it out".
  13. See <http://www.naturalnews.com/025627.html>, Retrieved, 17 March, 2010.
  14. See <http://www.iep.utm.edu/carnap/>
  15. Here Mayr (1997) is speaking for all twentieth century organicists who believe that there are "unique biological laws of integration and organization" essential to understanding organisms (Haraway, 1976, p. 194)
  16. Sarkar (1993) While many of the schools of eastern philosophy share the concept of a mind-matter spectrum, they take quite different approaches to the epistemological dualism of knower and known. For example Buddhism rejects, but Tantra accepts, the concept of an Atman, that is, an eternal, unchanging, witnessing entity beyond the ever-changing universe.
  17. See also, <http://www.harvardsquarelibrary.org/unitarians/wright-sewall.html>.
  18. For more on the role of information in physical phenomena see [http://en.wikipedia.org/wiki/Digital\\_physics](http://en.wikipedia.org/wiki/Digital_physics). See also McTaggart (2002, p. 35). Another physicist to explore the connection between modern physics, mind and consciousness is Fred Alan Wolf ([http://en.wikipedia.org/wiki/Fred\\_Alan\\_Wolf](http://en.wikipedia.org/wiki/Fred_Alan_Wolf)).
  19. By convention taxonomic trees are drawn upside down with trunk at the top, branching downwards to leaves at the bottom as shown in Figures 1 and 2.
  20. See summary of same at <http://www.marxists.org/reference/subject/philosophy/works/ge/feyerabe.htm>.
  21. Concerning the debates on scientific realism, this author agrees with the views expressed by Andersen et al. (2006, p.172) that "real-world factors function as constraints [in building conceptual models of the world] in the sense that they offer resistance against giving arbitrary structures to the world". This view also appears to be supported by Harrington: "Certainly, I share the conviction of most of my profession that the statements of science do not "mirror" the realities of nature in some simple, detached way. At the same time, I believe ...science ...apparently does ...engage phenomenal realities that "talk back" and whose logic is not wholly human..." (1996, Introduction, p. xxiii.)
  22. In *string theory*, particles are minute strings that vibrate in an abstract multi-dimensional space. The advantage of allowing particles to occupy a theoretical space is that their properties can then be explained by what happens in that space, thereby reducing the explanatory burden on physical space. In string theory, particle properties are derived from the mode of string vibrations.
  23. In relativity theory space-time is a field but it is not a substance with mechanical properties. However in quantum theory the vacuum state is both energetic and particulate in order to account for phenomena such as virtual particles and zero-point energy. In this sense space-time is a plenum or aether-like substance.
  24. Collectively, virtual particle processes are described as *vacuum fluctuations* (Greene, 2004, p. 330) and they contribute to a vacuum energy known as the *zero-point energy field*. (See McTaggart, 2002, chapter 2, for a non-mathematical account of the zero-point energy field. However, Greene in *The Fabric of the Cosmos* pointedly avoids the term.)

The interaction of virtual particles with real particles gives rise to *quantum jitters* which produce observable effects, such as the Casimir effect and van der Waals forces. The Casimir effect is a force that arises between two uncharged metallic plates placed a few micrometers apart. The effect is explained in Quantum Field theory by the partial exclusion of virtual photons between the plates. Van der Waals forces, named after a Dutch scientist, are the attractive or repulsive forces between molecules other than those due to covalent bonds and electrostatics. They are relatively weak compared to covalent and electrostatic bonds but sufficiently numerous to have major structural consequences. Many of the puzzling properties of the quantum world can be attributed to the interaction of real particles with virtual particles in the quantum vacuum.

25. Noam Chomsky's proposal for a universal grammar as a body of linguistic knowledge possessed innately by all language users can also be reinterpreted from a subtle organicist perspective. The locus of innate linguistic knowledge resides not in the developing cortex but is imposed by the substantive structure of ideas in psychic space.
26. For other metaphors to illustrate mind as an emergent property see, Towsey and Ghista (1995).
27. Here is Mozart's description of the intuitional process during composition: "When I feel well and in good humour, or when I am taking a drive or walk ...thoughts crowd into my mind as easily as you could wish. Whence do they come? I do not know and have nothing to do with it ...Once I have a theme, another melody comes, linking itself with the first one, in accordance with the needs of the composition as a whole. It does not come to me successively, with its various parts worked out in detail, as they will later on, but it is in its entirety that my imagination lets me hear it." As quoted by Brian O'Neill; *Mozart, Creativity and Gestalt Therapy*, [http://www.behavior.net/forums/gestalt/1998/16\\_5.htm](http://www.behavior.net/forums/gestalt/1998/16_5.htm)
28. Jayne based these insights on an analysis of changes in the language of the Old Testament and early Greek literature. The bicameral or two-chambered mind was from the perspective of our modern mind a divided mind. See also [http://en.wikipedia.org/wiki/Julian\\_Jaynes](http://en.wikipedia.org/wiki/Julian_Jaynes).
29. Doidge (2007) describes how the emergence of language, writing and reading must have made important changes to cortical brain maps, presumably with accompanying changes to human consciousness.
30. Doidge (2007) notes that the explosion of human interaction with electronic devices is changing the human brain.
31. Discreetness is another attribute required for scientific realism in addition to locality and cause and effect.
32. In this regard Sarkar makes a curious statement: "The day is sure to come when the omega of mathematics will coincide with the omega of biochemistry." (1991, p. 19) It is surely significant that he places that omega in the chemistry of life and not, as we might have expected, in fundamental physics.
33. Prehistoric communities are believed to have been matriarchal. According to biologist and evolutionist Professor Nancy Yanner (1981) the circumstances bringing this about were inherent in the evolutionary forces moulding early humans. The mother-child relationship placed females under strong selection pressure to find food for their young. So women were the first to develop tools for plant gathering etc. Concerning the incorpora-

- tion of Astaunga Yoga into the education curriculum see Bussey (2010a), *Education for Liberation*.
34. Concerning the incorporation of Astaunga Yoga into the education curriculum see Bussey (2010a), *Education for Liberation*.
  35. Snow, C. P., *Two Cultures*, The 1959 Rede Lecture, University of Cambridge. *Two Cultures* was subsequently published as a book, *The Two Cultures and the Scientific Revolution*. Snow wrote a follow-up in 1964, *The Two Cultures: And a Second Look: An Expanded Version of The Two Cultures and the Scientific Revolution*.
  36. In Sarkar's cosmology every wave/particle entity in the matter-mind spectrum has dual subjective and objective character. The objective attributes of a wave (energy, wavelength, etc.) are more apparent at the crude end of the spectrum. The subjective 'attributes' of self and agent are more apparent at the subtle end. From the perspective of contemporary human consciousness, the subjective attributes of matter and the objective attributes of mind are 'invisible'. Consequently it appears as if one end of the spectrum is subject and the other end is object, with the epistemological divide somewhere in between.
  37. This term is synonymous with Cosmic Consciousness and Supreme Universal Entity as used earlier in this essay.
  38. According to Gil Stein, director of the Oriental Institute, "It [writing] was the first true information revolution. By putting spoken language into material form, people could for the first time store and transmit it across time and space." See [http://library.bridgew.edu/mt/max/2010/10/hunting\\_for\\_the\\_dawn\\_of\\_writin.html](http://library.bridgew.edu/mt/max/2010/10/hunting_for_the_dawn_of_writin.html). The development of writing appears to coincide with the development of agriculture and the transition from a nomadic life style to large settled populations.
  39. See for example Brian Fagan (2004) who argues that bigger communities (up to some optimum size – an important caveat) can withstand bigger shocks to the food chain.
  40. Ken Wilber describes these transitions in terms of the dilemma confronting the *self* (see Wilber, 1990, chapter 10, 'Structure, Stage and Self', for example).
  41. Sarkar's optimism contrasts with Lord Martin Rees, President of the Royal Society, who suggests that humans may never understand physical reality because we have reached the limits of our cognitive ability. "Some aspects of reality – a unified theory of physics or a full understanding of consciousness – might elude us simply because they're beyond human brains, just as surely as Einstein's ideas would baffle a chimpanzee." (<http://www.timesonline.co.uk/tol/news/science/article7149095.ece>)

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