Signs in the Flesh: Whitehead and Evolutionary Metaphysics

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When considering how psychology is usually taught in universities, we find that while topics like physiology and evolution are widely discussed, metaphysics is not. Indeed, if it is ever mentioned it will be in passing, as students learn how psychology achieved its modern scientific status. They are likely to be told that metaphysics was merely inconsequential pondering on the ultimate nature of things and was left behind, along with alchemy and other relics of the dark ages. Modern psychology expresses the rational, empirical spirit of the late nineteenth century science and it is well rid of such irresolvable speculation.

What is proposed here is that the opposite is the case. The evolutionary metaphysics that will be sketched will not just help with the teaching of psychology, but might also help to rule out some absurd ideas which are currently attracting attention and help to make us more sensitive to the ecological consequences of highly technologised ways of life.

Psychology, more than other disciplines suffers enduring problems of identity. With them come uncertainty about what it is really studying and hence what its methods should be. Physicists and chemists spend little time discussing what they are studying or how they should go about it; it is fairly obvious. Psychologists by contrast, from the very inception of the subject, have discussed these matters continually. William James, Wilhelm Wundt, and other founding figures had no doubt that in order to address consciousness, its central phenomenon, the science of mental life, to use James' term, would need to combine subjective phenomenological investigations with objective experimental ones. With the turn towards positivism in the early twentieth century, advances in physiology and the rise of behaviourism this hybrid identity was challenged.

Later in the century, things changed again, as the shortcomings of behaviourism became apparent. Developments in information theory, computing and linguistics led to the cognitive revolution of the 1960s,

following which Howard Gardner announced 'The Mind's New Science' based on what was then known as the 'Information Processing Approach'.[1]

The New Science matured into what is still known as 'Cognitive Science', and, beginning in the late 1950s, created a vigorous research programme that lasted for about fifty years. It marked, on a small scale, a period of what Kuhn called 'normal science', characterised by a relatively stable set of shared assumptions about the nature of the subject matter and about methodology. A fundamental assumption was that the most generally applicable framework for understanding mental life was functionalism. Functionalism takes many forms, but they all share the notion that, simplifying, what defines a mental state in a part of a system is its functional relationships to other states inside the system and to what is outside it. The system might be a brain that has evolved in a given environment or, importantly, it might be something like a computer with no biological history or organic character at all. Broadly speaking, functionalism is the claim that the mind is what the brain does. This meant that functionalism's conceptual vocabulary could be operationalised as computation. It would also mean that if computers did what brains do, then they too would have minds. This raised the exciting prospect of creating artificial intelligence, AI. AI would not only be useful for human purposes but would also be a test bed for models of mental processes, allowing mental life to be studied, as it were, *in calculo*. Accordingly, computation became a seductive metaphor for mental life during the cognitive revolution and the computer achieved something like totemic status. By the 1980s confidence in the computational metaphor had reached the point where some cognitive scientists believed that they had finally discovered the nature of mental life. As one of them put it: "The computer is the last metaphor for the mind." [2]

There were dissenting voices. Notable among these were two major figures in the emergence of cognitive science, Ulric Neisser and Jerome Bruner. The reasons for their dissent are worth examining since they have a suggestively Whiteheadian character.

Neisser had helped to start the cognitive revolution but even as it appeared to be sweeping all before it, he became increasingly disenchanted. He saw that mental life could not be properly understood merely through making information processing models of what was supposed to be happening in the head, no matter how operationally explicit these models appeared to be. The models of perception and memory of the time did indeed have clearly specified processing stages that were set out

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[1] Gardner (1985).

[2] Johnson-Laird (1988), 367.

in discrete and predominantly linear sequences of operations. But they were based upon questionable assumptions in both cases. Perceptual models assumed that information available to the senses was inherently impoverished and hence needed to be enriched by memory and inference. Memory models mostly assumed that recall was a form of search and that storing items in memory was either the building of mental representations or the making of associations with representations already in memory.

Neisser objected that this was tendentious abstraction and that real psychological life was being distorted to fit the procrustean bed of the information process approach. It wasn't what perceiving and remembering were really like, as psychologists would realise if they would only observe these processes as they actually occurred in everyday life.[3] If they did, they would see that neither perception nor memory could be realistically abstracted away from the context of meaningful human action. For example, Neisser pointed out that when considered in context perception was not linear but cyclic. It was an interactive process where perceivers with expectations encountered arrays of energies that had been richly structured by the objects and events around them. Some of it would conform to their expectations, and some would not. In the latter case iterative internal adjustments and further active interrogation of the information available would need to follow. All of this would be hard to account for with serial, linear models.

Neisser was strongly influenced by the ecological approach of James Gibson who also mistrusted information processing models.[4] Gibson took it that the information available to the senses is not impoverished but unambiguously structured. One of his supporters crisply encapsulated their approach in the title of an article: "James J. Gibson's strategy for perceiving: Ask not what's inside your head, but what your head's inside of." .[5] Central to this approach is the notion of affordance. Affordance means the directly perceivable opportunities for action that a given organism will, depending on its intentions, notice or search for in the world it encounters. Chairs afford sitting on to tired people but not to a tired horse. The surface of a pond affords walking on to hunting insects but not to hunting dogs. The point here is that the perception of affordance is a process that cannot be abstracted away from the encounter between a purposeful organism and its surroundings. Affordance emerges within the

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[3] Neisser (1976), Neisser & Hyman (2000).

[4] Gibson (1966), Gibson (1979).

[5] Mace (1977).

mutually evolved components of ecosystems, where no clear boundaries can be drawn between organism and environment.

Jerome Bruner was also fundamentally wary of the cognitive revolution. Like Neisser, he had been instrumental in shaping it, but felt that its original impulse, which had led to the creation of the Harvard Centre for Cognitive Studies in 1960, had been diminished by the implicit reductionism of the information processing approach. His principal objection, which harks back to James and before him to Wundt and Dilthey, was that in their enthusiasm for functionalism, psychologists had somehow lost sight of meaning and culture. Moreover, when examined more deeply, the methods of the Mind's 'New' Science were not so new; indeed, they were the same positivist set as used by the behaviourists. For Bruner, in order for psychology to deal properly with mental life as it relates to human meaning: "[…] it must venture beyond the conventional aims of positivist science with its ideals of *reductionism*, *causal explanation* and *prediction*. […] To reduce meaning or culture to material base […] is to trivialise both in the service of misplaced concreteness." [6]

The Whiteheadian character of both Neisser's and Bruner's critiques is clear. Whitehead saw that perception, and mental life more generally, could not be properly studied without consideration of the body and actions of the perceiver (*cf.* AI, 289). He also saw that placing boundaries between the body and the world was fundamentally unproductive: "[…] we cannot tell with what molecules the body ends and the external world begins. The truth is that the brain is continuous with the body, and the body is continuous with the rest of the natural world." (AI, 290) Much earlier than Bruner, he realised that reductive materialism and the separation of body, mind and world was an epistemological dead end. Although he had the natural sciences primarily in mind, his view applies, *a fortiori*, to attempts to model psychology on them.

Psychologists and philosophers continue to discuss what psychology is actually studying and what its methods should be. In the process they are drawing steadily closer to a metaphysical re-think. Presently, another revision in psychology's underlying paradigm is in progress, one that began around 1991 with the publication of 'The Embodied Mind'.[7] The shift is considered to be sufficiently fundamental for at least one philosopher to announce, again, that 'The New Science of the Mind' has been created.[8]

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[6] Bruner (1990), xiii.

[7] Varela, Thompson & Rosch (1991).

[8] Rowlands (2010).

What is new this time is the rejection of the Cartesian trope that mental life is shaped and driven by something in the material brain that is essentially non-material. Whether that something is taken to be a soul or a computer function, the trope is much the same. The latest 'New' science of the mind moves significantly beyond this trope to claim that: "[…] mental operations are not confined to processes occurring in the brains of cognising organisms. Instead, they can be made up, in part, of processes that extend into the organism's body and even into the organism's world." [9] In describing this move, Rowlands offers what he calls a 'creative re-interpretation' of Gibson's ecological approach. This reinterpretation rests on epistemological and metaphysical claims. The epistemological claim is based on the insight, very like Neisser's, that organisms are active perceivers. While "The *metaphysical* claim is that visual perception does not start at the retina, but consists, partly, in operations that transform ambient information bearing structures." [10] Here, "operations" refers to actions of the perceiver and "ambient information bearing structures" means the way the arrays of energies available to an organism are structured by the objects and events in the environment. The perceiver transforms these by active investigation and in so doing comes to know what surrounds them and what they are able to do, which is another way of describing affordance. Again, the emphasis on action and embodiment as well as the dissolving of conventional conceptual boundaries are moves with a clear Whiteheadian character.

The announcement of another a 'New' science of mind marks the growing recognition that the cognitive revolution was neo-Cartesian and that the computer metaphor is fundamentally limited, to say the least. Nevertheless, echoes of the unrealistic aspirations of the 1980s remain.

One example is the idea that the human condition, including consciousness, will enjoy an organic integration with information technology, and thus evolve into the Transhuman condition. The Transhuman condition is supposed to be one that will result from cultural rather than biological evolution, where the capacities of human beings are enhanced to the point where they become a different species, one that has prodigious cognitive resources and that lives indefinitely. Bostrom identifies Transhumanism with the striving for power and perfectability found in myths such as Prometheus and Daedelus and in practices such as Alchemy.[11] In fact, something akin to Transhumanism can be seen in this

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[9] *Ibid.,* 25.

[10] *Ibid.,* 123.

[11] Bostrom (2011).

more recent proposition which was an early reaction to advances in information technology: “Let an ultra-intelligent machine be defined as a machine that can far surpass all the intellectual activities of any man however clever. Since the design of machines is one of these intellectual activities, an ultra intelligent machine could design even better machines; there would then unquestionably be an 'intelligence explosion,' and the intelligence of man would be left far behind. Thus the first ultra-intelligent machine is the last invention that man need ever make, provided that the machine is docile enough to tell us how to keep it under control.” [12]

The writer believed this would actually happen within the twentieth century. It didn’t, but the idea has survived and evolved into what is now known as ‘The Singularity’. The capitalisation is quite common, as befits the visionary status it has achieved. This status is shown by remarks by one its foremost advocates, who believes it will allow us to live “indefinitely” [13] which is good news, apparently. The originator of what it would be fair to call the Cult of the Singularity, believed, in 1993, that: “Within thirty years, we will have the technological means to create superhuman intelligence. Shortly after, the human era will be ended.” [14] Since we may have only a few years to go, perhaps those interested in the human condition should hurry up and study it; it could soon be gone.

A notable oddity here is the seriousness with which such nonsense is taken. More able observers of technology and human culture easily recognise: “[…] the blissed-out technoidiocy of people who talk about downloading human consciousness onto a chip. […] It’s a kind of techno-masculinism of a self-caricaturing kind. It’s stupid and silly, and hardly worth commenting on except that powerful people turn it into projects and so you have to comment.” [15] Indeed, the power behind billions of dollars has created the Singularity University now thriving in Silicon Valley.

Something significant is going on when a project involving a transparent *folie de grandeur* like Transhumanism gets such huge funding. Perhaps what is happening is that technology is developing so quickly that it has outrun society's capacity to distinguish what is real from what is fantastical and hence to control it. In the epilogue to his

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[12] Good (1965), 33.

[13] Kurzweil (2012).

[14] Vinge (1993).

[15] Haraway (2006).

essay *Das Kunstwerk im Zeitalter seiner technischen Reproduzierbarkeit,* which is often mistranslated as 'The work of art in the age of mechanical reproduction.' Walter Benjamin noted that when society cannot control technology, the result is violence and even the aestheticisation of violence.[16] Although, writing in 1935, the violence to which he refered was warfare, the contemporary explosive growth of information technology also does a species of violence to the human condition when it fosters a collective mental disorder like Transhumanism.

Perhaps the cure might be a dose of metaphysic. A Whiteheadian shift in our implicit metaphysics would simply rule out the idea that mental life, or indeed living processes of any sort, can be abstracted from their organic vehicles and their evolutionary histories, thus making the absurdity of Transhumanism patent. Technological simulacra will increasingly resemble living things and, accordingly, this may become more culturally significant. But resemblance is not identity. Enriching our metaphysics so that cognition, intentionality and affect cannot reasonably be seen as other than aspects of active and evolved forms of life is the necessary step in understanding just what technological simulacra are able, and more importantly, not able, to become.

Happily, such a shift is in progress. The last decade or so has seen renewed interest in alternatives to the reductive physicalism of the late nineteenth century, whose persistence in much of the twentieth was helped by being preserved in information processing psychology. Of course such alternatives have a longer history, reaching back in the West to the pre-Socratics. It is quite likely that the Hellenistic world of that time was influenced by eastern traditions such as early forms of Advaita Vedanta, which offers a fundamentally process-like metaphysics. Further east still, we find Taoism too offers a picture of cosmos that is in a process of continual productive change to which humans should harmonise their actions even if it cannot be rationally understood.

It seems to be a universal human experience that the world is fundamentally process-like and that it is knowable through intuitive engagement. Sadly, it is an experience that has been marginalised over the past three or four centuries of rapid cultural change that marked, broadly speaking, the rise of the Modern world view and of the mechanistic metaphysics that came with it. That style of metaphysics dominated the late-nineteenth century when modern psychology took shape and is preserved in psychology today, much to its detriment. There was a triumphalist feel to claims from reductive mechanists of the late nineteenth century such as Ernst Haeckel: "The great abstract law of mechanical causality […] now rules the entire universe, as it does the

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[16] Benjamin (1936).

mind of man; it is the steady, immovable pole-star, whose clear light falls on our path through the dark labyrinth of the countless separate phenomena." [17] The countless separate phenomena, the "Ten thousand things" of Taoism, were, it seemed, simply one phenomenon. The cosmos was a gigantic machine inside which the human condition, with its illusory subjective core, would in time be fully explained away by better mechanistic understanding. Although poets and priests might claim to have an intuitive grasp of nature as something alive and organically compatible with human experience, they were mistaken. The advance of science would disclose the mechanistic laws that would explain their error.

Passing lightly over centuries of critical development, we find figures such as Bergson and Charles Sanders Peirce fundamentally dissenting from this view. We may take them as precursors of the shift towards the sort of evolutionary metaphysics being advocated here. While Whitehead acknowledged Bergson's influence it seems that he took little or no interest in Peirce, even though he had a minor role in editing Peirce's papers at Harvard. In fact, there are deep and productive links to be made between the two. Peirce's process ontology is a complement to Whitehead's and he arrived at it independently. His engagement with the science of his day was at least as deep as Whitehead's and more empirically productive, as witnessed by his lasting contributions to astronomy and geodesy. But behind this work lay a pragmatic view of logic and truth that steadily spread from his concerns with human thought and communication to become a radical ontological surmise. Concerning the sign as a means of communication, Peirce observed: "A sign, or representamen, addresses somebody, that is, creates in the mind of that person an equivalent sign, or perhaps a more developed sign." [18] The crucial phrase here is "more developed" . As signs are exchanged and elaborated within a system, that system becomes more complex and new semiotic relationships emerge among its parts. This is what happens in human conversation; the exchange of words, sounds and gestures deepens and elaborates a shared history of mental experience.

However the human capacity for language, indeed the human condition itself, will not have sprung into existence *ex nihilo*, but will have been prefigured in the pre-human world of our evolutionary ancestors which, in turn will have been prefigured in their evolutionary precursors. Unless arbitrary qualitative breaks are to be inserted into this chain of pre-figuring, it must reach back through the human, animal

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[17] Haeckel (1935), 366.

[18] Peirce (1897).

organic and pre-organic levels of existence. Peirce appears to have come to a conclusion something like this when he proposed that: "Thought is not necessarily connected with a brain. It appears in the work of bees, of crystals, and throughout the purely physical world […] Not only is thought in the organic world, but it develops there." [19] Note here that the "organic world" is the only one there is.

Peirce's distinctive form of Panpsychism rests on taking the semiotic understanding of causation that he observed in organic systems and applying it throughout nature. This attempt to find a metaphysics compatible with human actions and experiences, as well as with the natural world, recalls the instinctive recognition by the German Idealists that the organic world, properly understood, could not be reduced to mere mechanism. Schelling, for example, wrote to Goethe in 1801 thanking him for his work on metamorphosis because it had helped him to recognise the "[…] inner identity of all organic forms amongst themselves and with the earth […] thus the organic was never created but has always existed." [20] Causality in the organic world, the only world, is formal, but this has been obscured by the immense practical success of focussing on material and efficient causation that has produced the science and technology that has transformed our relationship with the natural world over the past four centuries or so. Since abstractive reduction to efficient causes is so demonstrably effective, it has led to the assumption that it must be an epistemological fundamental and, hence, be applicable everywhere.

But this assumption can be challenged, as Bergson realised. Although his evolutionary metaphysics ran counter to the scientific thought of his day it had an immense impact. That this was especially so in the arts is a signal that it captured an intuitive sense shared outside the scientific community that there was more to nature than reductive physicalism was able to grasp. Presently, the ecological damage being done by technologised cultures is acting as another signal, and the effort to develop an evolutionary metaphysics is being renewed. To do so at the present time is to challenge our most important assumptions. They are important not only because they concern important things but also because we do not easily realise that we have them. Action based on unrecognised assumptions can lead to trouble, as shown by the harmful ecological impacts of industrialised technology that are presently beginning to be recognised. A metaphysics based on efficient mechanical

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[19] Peirce (1906), 97.

[20] Fuhrman (1962), 243.

causation alone does not provide the basis for harmonising the works of human beings with the pre-human world on which they in fact rely.

Peirce was not concerned with ecological harm, but his thought, since it is fundamentally relational, is deeply ecological. For him, as for William James, relations between things were as ontologically significant as the things themselves. This is the more so for Whitehead, since in his metaphysical surmise, ultimate 'things' are not objects but events, happenings or occasions of experience. Peirce complements this view by fleshing out those occasions as part of an evolving pattern of semiotic relations. This underlies Peirce's distinctive interpretation of subjectivity, causation and evolution. As he extended and deepened it, it matured into his view of the world which he saw as an organic process of open cumulative signification that continually produces true novelty. He believed that nature is animated by an economy of signs and, consequently, was in a continual process of structured becoming. Evolution was the result of the active interplay between dynamic structures of formal causation that endure by virtue of that interplay, not through the persistence of some self-identical Platonic essence. The enduring structures were not confined to the organic world but were ontologically ubiquitous. This dynamic view of what it means to endure through relations is very close to Whitehead's. It led Peirce to propose that what are commonly assumed to be unchanging, necessary physical laws are not eternal features of reality. They are, in fact, evolved habits of nature which, being evolved, are contingent rather than necessary. It is hard to imagine anything less like the reductive physicalism prevailing in science when Peirce was developing these ideas.

Alternatives to reductive physicalism have always been available, but those presently being proposed, most of which are varieties of dual-aspect or reflexive monism, are more fully worked through, partly in response to new scientific discoveries and partly because of an underlying change in the scientific picture of the world. It appears that we are presently at a point where the reductive impulse of the previous century or so has run its course. Not surprisingly, Whitehead often figures in these alternatives.[21] Also, they challenge the assumption that anyone treating the mind body issue must first consider whether what they propose is compatible with physics.[22] Setting aside for the moment the important differences between pre- and post-quantum physics, what is happening is that the assumptions underlying physics, and approaches in sciences modelled on physics, are being questioned more deeply than

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[21] Weekes (2012).

[22] Velmans & Nagasawa (2012), Nagel (2012).

hitherto. Physics is demonstrably correct within circumscribed situations, but it's not the final word when complex systems with evolutionary histories are to be understood.

Again, this is not new. Bergson was clear that when physicists spatialise time and present duration as a linear succession of instants, they render themselves unable to say anything of importance about duration itself, either as an index of evolutionary change or as the essence of subjective experience. In biology too, there has been an enduring, if minor, tradition opposed to the more reductive uses of Darwinism. There were strong echoes of Goethe in the rational biology of D'Arcy Thompson[23] and a similar spirit can be seen in more recent efforts of biologists to move beyond the restrictions of neo-Darwinism. These include recognising the importance of epigenetic factors[24] and returning to the idea that organisms are active in the process of evolutionary change.[25]

Something like this move was made over a century ago by Jacob von Uexküll. He treated animals as subjects who perceive and act in order to harmonise their form of life with that of other forms around them. Seen in this light, when organisms encounter the world, they seek opportunities for optimal action, preconsiously striving for what Merleau-Ponty called 'maximal grip'.[26] Organisms not only persist in Spinozist enjoyment of their own being, but also strive for optimality and to extend their domain of action by assimilating to their repertoires of action whatever objects and circumstances they encounter; they are also changed in the process by having to accommodate to them, much as Piaget proposed. Organisms, hence, are not static but in a continual process of integrated phylogenetic and ontogenetic advance. Von Uexkull portrays this striving as reflecting what he called a 'Plan', in the German sense, which implies more than merely a strategy or blueprint, and was more like an overarching pattern or the logical organisation of a system. This organisation is not fixed, but able to adapt and change with circumstances. Evolution on this view was less a matter of chance and more to do with the active changing of the patterns of interaction between the organism's Plan, its morphology and what it learns about the meaningful aspects of the world around it, which are also evolving, or co-

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[23] Thompson (1917).

[24] Oyama (2001).

[25] Goodwin (1989).

[26] Merleau-Ponty (1962).

evolving. Such a view is much like what is now referred to as 'Evo-devo', the treating of ontogenetic and phylogenetic change together as a complex of epigenetic factors that both stabilise species and permit them to adapt.

Contemporary biosemioticians are developing von Uexkull's project by combining it with Peirce's semiotic understanding of causation to give it more substance and to relate it more fully to contemporary biology.[27] They present organisms as relating to their environment through the exchange of meaningful, structured patterns of energy and action rather than merely by reflexes or mechanical force. Here there is little or no drawing of sharp boundaries between genotype and phenotype, while the mutuality of the knower and the known is central. Organisms and their niches evolve together. Indeed, in many ways, they create each other.[28] If a form of life has evolved and developed within a given environment, its morphology, its Plan and its cognitive resources will all be tuned to signs of what is meaningful for that form. This tuning is the refining of the capacity to notice and to act towards relevant affordances which are, hence, best seen as the environmental signs that comprise the Umwelt of that form of life.

What is taking shape here is a semiotic understanding of evolution where the dynamically enduring autopoietic structures or parts of nature are systems of relationships. These can be ecosystems, organisms, organs and so on down the scale of size and complexity. They arise, interact and, if compatible with the conditions around them, persist, while at the same time changing. That something can persist while changing is a point made by Whitehead in a number of places, e.g. : "[…] the only endurances are structures of activity, and the structures are evolved." . (SMW, 110)

Taken together, Peirce and Whitehead provide a thoroughgoing evolutionary metaphysics. From Whitehead comes the picture of a world of process that advances without repetition. From Peirce comes the picture of signification as formal causation that has an irreducible experiential component to it. In this framework, subjectivity is a fundamental part of the natural order and part of what allows it to evolve. Consciousness drives and directs evolution. It is not something that only appeared once evolution had produced sufficiently complex forms of life to host it. With the appearance of the enigmatically reflexive form of human mental life, consciousness itself has come under scrutiny, but it has always been there. Something like this idea can be found in one of

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[27] Hoffmeyer (2008).

[28] Odling-Smee et al. (2003).

the key works of contemporary biosemiotics by Jesper Hoffmeyer who notes: "The world has always meant something. It just did not know it." [29] Although Hoffmeyer does not take sentience as an ontological primitive, as Whitehead and Peirce do, he nonetheless observes that: "Subjectivity has its roots in the cosmos and, at the end of the day, the repression of this aspect of our world is not a viable proposition." [30]

Rather than being repressed, the proposition has often been promoted in some detail. David Bohm, for example, put forward a view of the world as comprising two ontological orders enfolded in each other. These orders are the material or 'somatic' order and the order of meaning or 'signification'. The two orders are in a continual process of enfolding into and unfolding out from each other. Enfolding renders one order implicit in the other, whilst the complementary process of unfolding makes the emerging order explicit. What appear to be material objects or events emerge from the order of signification while, in complementary fashion, what we take to be mental events emerge from and are inseparable from the somatic order that produces or supports them.[31]

The resemblances between Bohm and Peirce are real and significant. Both take the essence of mental life to be signification and both draw no qualitative boundary between the material world of matter and the mental world of meaning and its attendant subjectivity. This metaphysical gambit prefigures more recent advocacy of panpsychism, which despite being marginalised in the late nineteenth century, has returned as an idea worthy of serious consideration.[32] What has appeared, or re-appeared, is the idea that the psychic domain, and with it subjectivity, is as ontologically fundamental as the physical.[33] What Bohm, and Peirce before him, add to this idea is that the essence of the psychic domain is signification, meaning or intentionality.

This is a turn, or return, to a form of metaphysics that takes the world to be a process of sentient, structured advance. Like earlier varieties of panpsychism it makes it difficult to draw functional boundaries between physical and experiential phenomena. What the present developments

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[29] Hoffmeyer (1996), 154.

[30] *Ibid.,* 57.

[31] Bohm (1985).

[32] Skrbina (2009), Strawson (2006).

[33] Chalmers (2013).

also do, however, is to show that signification, in the sense advanced by Peirce and Bohm, underlies the creative evolutionary advance of nature.

This is to give Aristotle's somewhat neglected category of formal causation a central role in an evolutionary metaphysics. If signification is the means by which all levels of the natural order influence each other then proposing strong functional boundaries is unproductive abstraction. What mediates the functional relationships between all levels of the natural order is a common currency of signification, producing a qualitative uniformity in all forms of causation. There are no functional gaps in nature; no " … we should reject the notion of idle wheels in the process of nature." as Whitehead puts it (MT, 156). Signification adds meaning to activity and hence adds direction as well. The creative advance in Whitehead's scheme is the necessary consequence of taking the 'actual entities' of which the world is made to be subjective events and to "[...] start with the event as the ultimate unit of natural occurrence." . (SMW, 97) An event is a prehension – the taking of a datum into itself by an actual entity. But the prehension itself is meaningful, since it depends on the subjective form of that datum (*cf.* PR, 23) What 'subjective form' does here is to describe what the datum means to the actual entity i.e. what it signifies. Thus, signification is implicit at the heart of Whitehead's metaphysics. Moreover, it adds to its evolutionary character a vector quality. If prehensions are shaped by the subjective form of the datum and continuous with prior prehensions, then this is how nature's creative advance acquires direction.

To deepen the notion of prehension in this way adds to the somewhat limited use made of Whitehead by both Merleau-Ponty and Deleuze. They are both drawn to Whitehead's event-like ontology, perhaps reflecting their inheritance from Bergson. However, their use of it is primarily to suggest what provides the motive force for evolution. For Deleuze what drives evolution on appears to be the division of intensive forces, rather like the steam in the boiler of a locomotive. What gives evolution a direction in his scheme appears to be a series-like process of self-organisation marking the transition from the virtual to the real. The nature of the series is unclear and seems an obscure mathematical analogy.[34] If instead we take the series to reflect the inheritance of semiotic qualities by each virtual-becoming-actual member from the preceding now-actualised member then the series acquires a direction. Here, the inheritance of qualities appears to be another example of formal causation similar to Whitehead's 'prehension of subjective form'.

Merleau-Ponty, too, takes from Whitehead the idea that the 'internal activity' in nature implies an advance. But, like Deleuze, he leaves open

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[34] Deleuze (1993), 105.

what might direct that advance. He seems to approach this issue when enquiring into the human phenomenological encounter with nature. There he says: “I am, through my body, part of nature, and the parts of nature admit between them relations of the same type as those that my body has with Nature.” [35] Whitehead says something similar to this and to the definition of embodiment offered by Rowlands above: “Human experience is an act of self-origination including the whole of nature, limited to the perspective of a focal region, located within the body, but not necessarily persisting in any fixed coordination with a definite part of the brain.” (AI, 255)

To propose that a localised experience could be related to the whole of nature is incompatible with the disjointed mechanistic metaphysics of modernity. But compatability is restored if the relations between parts of nature are taken to be of the same quality as those that the body itself has with nature, since they are thus rendered as relations of meaning. Here ‘meaning’ is the possibility for action. Meaning in this sense is what a form of life, human or not, resonates to and retains from its engagement with what Merleau-Ponty calls the ‘flesh’ of the world. The flesh is not a pre-existing world waiting to be known, but the arena of mutual activity in which perceiver and perceived are co-created.

What is being proposed here is that this co-creation is mediated by signs, or affordances. If the qualitative engagement between a form of life and the natural world is mediated by signs then it has an intrinsic vectorial quality, reflecting the intentional stance of that form of life. It is this that guides the creative advance and sensitises the form of life to the informative structure in the arrays of energies it actively acquires from its surroundings. This proposal opens the way to an evolutionary metaphysics based on Bohm's and Peirce's semiotic understanding of causation. Conceived in this way, subjectivity evolves within nature and cannot be separated from its organic vehicles, which rules out absurd notions such as Transhumanism.

Signification itself is a property of the flesh of the world, to borrow Merleau-Ponty's term. Nature seen under the aspect of signification is full of more-than-human meaning[36]. To believe this may help to repair the alienation of humans from nature, and the disenchantment of nature itself, that has been a pernicious legacy of modernity. To recognise, both intellectually and more deeply, that the particular reflexive form of human subjectivity is a variety of more fundamental forms of subjectivity may help to bring us towards more sustainable ways of living. In Peirce’s

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[35] Merleau-Ponty (2000), 159.

[36] Abram (1997).

view human belief is something which guides action until challenged by experience. Our experience at present is of ecological damage resulting from an over-consumptive human culture driven by insensitive technology. As we become more aware of this we also become more able to understand and hence to mitigate the role played by a mechanistic metaphysics which reduces the organic world to a mere standing resource for human use.

What has been sketched here is a new metaphysics that takes the cosmos to be animated by meaning. It rests on the idea that there are signs in the flesh and that subjectivity guides nature's creative advance. It also supports Nagel's surmise that "The Materialist Neo-Darwinian Conception of Nature Is Almost Certainly False." [37] Whitehead, Bohm and Peirce would almost certainly have agreed.

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[37] Nagel (2012)

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