



# Nature in Process

Novel Approaches to Science and Metaphysics

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11<sup>th</sup> International Whitehead Conference Abstracts  
**FRIDAY, 28<sup>TH</sup> JULY**

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**Jeroen B. J. van Dijk**

**“Process Physics: A neo-Whiteheadian physics that is bio-centric, habit-establishing, mutually informative and compatible with ecological psychology”**

In the long history of our thinking about nature, several different kinds of physics have come and gone in and out of fashion – each with their own specific understanding of what time is. Close to the end of this list, we’ll find what is today almost unanimously considered to be the absolute climax in the history of thinking about time: Einstein’s Special Theory of Relativity. Thanks mainly to Minkowski’s block universe interpretation, the special theory of relativity led to the now well-established belief that nature is actually a giant 4-dimensional spacetime continuum in which all of eternity exists together at once as a huge static and timeless expanse.

In his controversial, yet well-received book *Time Reborn* (2013), Lee Smolin passionately argued against this thoroughly counterintuitive idea that there’s no actual passage of time and that all experience of time passing by is illusory. More or less as an antidote, he suggested that it would be far more likely that nature evolved according to a Peircean principle of precedence and that our physics should therefore be routine-driven, instead of based on eternally valid static laws. From that point onwards, he has been trying to put together a habit-establishing way of doing physics that avoids all the problems of our mainstream physical sciences.

But because there already is a well-matured, but still fairly unknown other contender, namely Reg Cahill’s prize-winning Process Physics<sup>1</sup> (2003), let’s first take a look at how this alternative methodology might work out: Process Physics can be characterized as a neo-Whiteheadian, habit-centered, biocentric way of doing physics *without* a box. It starts out with an initially undifferentiated homogeneity of noisy, self-organizing background processuality which gradually turns out to give rise to an ever-more complex network of dynamically evolving relationships. It does so by setting up a stochastic, self-reference-based modeling of nature in which all self-referential and initially noisy activity patterns are ‘mutually in-formative’ in the sense that they are actively making a meaningful difference to each other (i.e. ‘in-forming’ or ‘actively giving shape to each other’). In this way, the system evolves from its initial featurelessness to then ‘branch out’ to higher and higher levels of complexity – all this according to roughly the same basic principles as a naturally developing neural network.

Because of this self-organizing and noise-driven branching behaviour, the thus emerging relational network can be thought of as habit-bound with a potential for creative novelty and

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<sup>1</sup> Cahill has been awarded the 2010 Gold Medal of the Telesio-Galilei Academy of Science for the development of Process Physics.

open-ended evolution. Furthermore, three-dimensionality, (quasi-)classical behaviour, and gravitational, relativistic and inertial effects are spontaneously emergent features within this evolving web of interrelations. Also, the network's constantly renewing activity patterns bring along an inherent present moment effect, thereby reintroducing time as the system's 'becomingness'. As a final point, subjectivity – in the form of 'mutual informativeness' (which is also used in Gerald Edelman's and Giulio Tononi's extended theory of neuronal group selection to explain how higher-order consciousness can emerge) – is a naturally evolving, innate feature, not a coincidental, later-arriving side-effect or epiphenomenon.

### **Main references:**

Cahill, Reginald T. "Process Physics: From Information Theory to Quantum Space and Matter." *Process Studies Supplement*. Issue 5, 2003.

Edelman, Gerald M., and Giulio Tononi. *Consciousness: How Matter Becomes Imagination*. London: Allen Lane - The Penguin Press, 2000.

Gibson, James J. *The Ecological Approach to Visual Perception*. Boston: Houghton Mifflin, 1979.

Smolin, Lee. *Time Reborn: From the Crisis of Physics to the Future of the Universe*. London: Allen Lane, 2013.

### **Jonathan Delafield-Butt**

#### **"Coherence of Consciousness in a Cell: Biological criteria for living consciousness, why robots don't have minds"**

This paper investigates the atomic and molecular composition of living, biological organisms with focus on cellular composition to address the question how minded, conscious experience of organisms and cells might exist co-incident with the experiences of its basic matter. Atoms and molecules are normally considered dead and insentient, but process metaphysics gaining traction in contemporary philosophy suggests they are conscious entities with basic mental faculties of perception, appraisal, feeling and intention made manifest in their existence and activity. This pansychist view is advanced to examine the atomic and molecular composition of cells, with particular attention to its physical nature and its implications for an organismic consciousness. Four unique psycho-physical properties of atoms and molecules within living cells are drawn out and explored: (1) they are free-moving individual entities (2) they include all three phases of solid, liquid, and gas, and importantly, (3) they are bounded into compartments. Altogether, this arrangement delivers (4) an instantaneous shared electromagnetic field composed by the individuals and altogether shared simultaneously across them. We reason this material organisation gives a concurrent mental organisation of a rich multidimensionality of its many parts, made coherent and unified by lawful electromagnetic properties. This is nature's solution to the composition problem. In sum, living atomic and molecular organisation is contrasted with that of inert solids used in modern electronics and mechatronic robotics to show that in their present form and in this metaphysical frame, robots cannot have coherent, unified minds as cells do.

**Whitney A. Bauman**

**“Ernst Haeckel’s Non-Reductive Materialism: Re-thinking the Death of Nature”**

The 19<sup>th</sup> Century German scientist, philosopher and artist, Ernst Haeckel, was one of the first thinkers to reevaluate all of life within an evolutionary framework. In doing so, he sought to give value to all of reality and avoid reductions of everything to some type of idealism or crude materialism. Furthermore, he developed his evolutionary, naturalistic worldview in direct opposition to what he saw as the largest philosophical error of all: metaphysical dualism (of matter/energy, body/mind, nature/spirit). During the time in which Haeckel was writing, it was not at all clear what methodological and epistemological foundations the emerging natural sciences might adopt. Whereas some were arguing for reductive materialism, some for idealism, and still others a dualism in which science dealt with the material world and the humanities dealt with the “spiritual” world, Haeckel argued for a triune form of Monism in which matter, energy, and experience were present in some form “all the way down.” This paper argues that the so-called “death” of nature during the scientific revolution was not fully embraced in the form of scientific materialism until the Second World War. At least until WWII, there were multiple non-reductive models (Haeckel’s among them) for framing a naturalistic worldview. However, the war conscripted many scientists into a reductive model in order to produce war technologies. Once the war was over, the technology transfer required by the Green Revolution in Agriculture, and advances in communication, transportation, and production in general, consumed many scientists. This reductive/productionist model came under scrutiny again with the writings of Rachel Carson and the beginnings of the contemporary environmental movement. Thus, reductive materialism, far from being the assumed and normative foundation for the “modern” sciences, is in reality a 30-year anomaly. From this perspective, Haeckel’s triune Monism (as well as other non-reductive models of nature including that of Whitehead’s) should be more seriously considered as a basis for a viable non-reductive naturalistic method for the sciences today.