

## **Panel on Natural Sciences**

1. **Prof. Michael Heather (UK) & Prof. Nick Rossiter (UK).** “*Formal Order and the ‘Loveliness’ of Nature*”

[michael.heather@cantab.net](mailto:michael.heather@cantab.net)

<http://nickrossiter.org.uk/process/>

### **Abstract**

Alfred North Whitehead (1882-1947) devoted a long life to study the nature of Nature which he called ‘loveliness and power’ (AI 1933, p19). While he believed in the component of romance in education he was unable to express formally this value of Nature in the algebraic forms of his early work.

In his later period he recognised ‘the welding of beauty to regularity of geometrical form’ (AI 1933, p124) but realised that this formed part of a radically different cosmology of events that he could best represent by abandoning his former descriptions in mathematical terms.

Heavily influenced by the description of creation out of chaotic flux from Plato’s ‘what becomes and never is’ in the discourse of Timaeus (27d5–28a1) Whitehead pursued an alternative cosmology top down from metaphysics. This is in diametrical opposition to the Semitic concept of creation bottom up ex nihilo that forms the basis of the current main-stream ‘Big Bang Theory’. The justification of the profound differences between the two theories was never fully tackled by Whitehead and remain a challenge for Whiteheadian scholars today. These are to be briefly reviewed in this contribution to the Workshop

The beauty in nature seems universally recognised. Yet in the mainstream theory it seems to rest on no more than some subjective quantitative appreciation of order. Whitehead’s theory of events wrapped it round with qualitative philosophical considerations but he was not able to provide a formal objective description. This may now be possible with the arrival of Category Theory which was not fully understood at the time of his death.

Category Theory is itself relevant as a metaphysical language that has brought to the fore the existence of universal limits and co-limits that are formally connected by adjointness. That is the generalised relationship between syntax and semantics for contravariant endofunctors  $F$ , a free functor and  $G$ , the underlying functor with the adjunction written as

$(F \dashv G)$ . An adjunction is a three level relationship that is beyond the capability of Boolean set theory. It seems that Whitehead intuitively appreciated the notion of adjointness but lacked the means to portray it although he tried (HL2 p144).

Process entails an inherent internal connectedness between entities while set theory needs to impose some external function to form relationships. This can only be arbitrary and arises because the elements of a set are independent one of another. Mathematical categories on the other hand provide individual objects with the inherent connectedness although that is a somewhat simplified statement and there is much more to it. Adjointness is at the heart of all relationships and can be represented in Category theory by the self adjoint Pulation Square also known as a Dolittle diagram. Such a diagram integrates formally the qualitative with the quantitative aspects of any relationship. Because it is not static but Process that describes how nature advances in artistic beauty by accumulative adjunctions. This is the cosmology from the physical to the human mortal state:

Chaos—| Kosmos —| Eros

Eros is Plato’s World of ‘loveliness’ (Timaeus 69c3-e1).