Towards a 21st Century Post-Scientific Paradigm Shift

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It is possible to represent the dynamic nature of the understanding of our surroundings in a way which is similar to the scientific description of reactionary phenomena, with regions of stability corresponding to general acceptance of currently formulated perceptions and regions of instability giving birth to dramatic comprehensional phase changes (Szamosi, 1986). It is becoming clear that we are at present in such a region of instability. The classical-quantum dilemma of the 1920–30s has even now not been completely resolved (Bohm, 1957; Baggott, 2004; de la Peña et al., 2015), and developments stemming from the study of non-equilibrium contexts (see, for example, Crooks, 2000) and chaos (Oestreicher, 2007) further compound the perceived complexity of the Universe when viewed from our still classically biased viewpoint. Since around the 1960s (Rachel Carson's "Silent Spring" was published in 1962) there has been a progressive rise in the importance of ecological ideas in reference to biological contexts. However, no such rise has been notable in the 'exact' sciences, although ecological ideas would clearly find a place there. The exact sciences operate by the categorical division of plausible influences on experimental procedures into the 'relevant' and the 'irrelevant', but this is demonstrably insufficient in general, although valuable as a means of establishing approximations. Most particularly this omission is observable in the domain of quantum mechanics, where its lack is arguably responsible for the progressive collapse of logical consistency (Antoniou, 1995) and the requirement for probabilistic approaches on moving from single quantal interactions to the establishment of larger quantal assemblies.

A viable first move forwards would be to initially apply ecological principles to *all* experimental situations, and then recognize in specific instances that the all-embracing ecosystemic experimental context reduces to a possibly small number of easily characterizable parameters – thus retaining where adequate the 'exact' nature of scientific investigation.

The second strand of a move forwards would be to recognize the importance of scale and hierarchical structure in Nature, and the ways in which these aspects must modify the ways in which we view ecology itself and its application to science in general. A prime example of such a modification is the necessity to recognize that, in a scaled system, local phenomena are guided by global features, and global properties depend on local effects (Cottam et al., 2018) – these twin characterizations radically affecting any possibility of successfully reductively disassembling a system into valid individually representative subunits. In this, such a second strand would of necessity adopt the general ideas of *relational biology* (Rosen, 1991).

A third strand would be to recognize that complete categorical separation of the extremes of a one-dimensional phenomenon is unrealistic: in such a scheme there are always examples of phenomena which fall between the two categories (for example, the place of viruses in a scheme which relies on self-reproductive capability to define what is alive). Far more realistic is to accept that membership of any such category is one of partial adherence, and that in reality only partial intermediates exist, and not the categorical extremes themselves. A simple example of this is the definition of 'size' of an entity: all recognizable physical entities have a size somewhere between unattainable perfect localization and unattainable perfect delocalization.

A fourth strand would be to accept that the categorical distinction between 'concrete' and 'abstract' is no longer sufficient, as it leaves out of consideration the major characteristics of systemic and living unifications, for example. In reality, perfect concretion and perfect abstraction are unattainable, in the same manner as for the extremes of size of a physical entity cited above.

Fifthly, in a similar manner, the categorical separation of 'subjective' and 'objective' is no longer sufficient, and neither in pure form is attainable, for a combination of ontological and epistemological reasons. Taken together, these five integrated strands comprise a completely new view of the investigation of Nature, which still permits the performance of reductive strategies where these are appropriate.

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