

BOOK REVIEW

ONE MAGISTERIUM: HOW NATURE KNOWS THROUGH US

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Seán Ó Nualláin, *One Magisterium: How Nature Knows through Us*, Cambridge Scholars Publishing Ltd (Sept 2014) - <http://www.cambridgescholars.com/one-magisterium>

How to “review” this sprawling, brilliant, eclectic, myriad, mosaic, welter of issues and ideas, most brilliant and an interwoven tapestry?

I begin, non-standardly, with lines from the Exposition and Introduction, having read O’Nuallain’s stunning, confusing, evocative book.

1. Einstein Ricci and Riemann tensors, and mind able to understand this
2. Mathematics and theatre troupe authentic dialogue with external reality
3. Participatory universe in which our choice of what to observe has objective consequences as nature gets to know itself through us.
4. Syntax intrinsic to biology yet also semantics in biology and ontological distinctions
5. Natural language processing by computer, NLPBC. NLPBC fails:
6. Protein, structure but also function
7. Biological explanation is teleological: heart’s purpose is to pump blood.
8. Consciousness: resonance between neural process and the intentional object. Mystery of attention.
9. Social and Political worlds. WAR AGAINST ABSTRACT NOUNS LIKE “TERROR”. MASSIVE SPYING.
10. Science and religion in Anthropic principle universe?
11. Un-reducibility of folk psychology to eliminative materialism.

12. Third person statements yet also Buddha metaphysics, psychology ontology and path of self- integration.

13. Mania for identifying particular human activities with physical locations in the brain.

14. Brains capable of manipulating tensors of 4th order, FRMI are scalars. This localization reduction is greedy and doomed to failure.

15. Academy-industrial complex

16. Evolution as a subset of emanation

17. Science versus first person experience

18. Biology is in at least as deep a conceptual muddle as Cognitive Science

19. Evolution as a symbolic process, with syntax.

20. Spirituality and action.

To review this sweep is beyond my capacities. Reading it made the hairs on the back of my head stand on end, awed at its range, its ambitions, its hopes, its daring.

If I cannot review, the best retreat of scoundrels is “musings”. Sean has set me to musings. These are my musings of course, triggered by O’Nuallian.

First, why might “syntax” be critical to biology? One thinks of the most obvious “code” the genetic code. We all know: DNA is transcribed into RNA, processed sometimes into messenger RNA, then translated into protein. OK, but we also know that translation requires not only the ribozyme, but also the set of encoded protein enzymes that each properly load the appropriate transfer RNA with the “right” amino acid to that tRNA such that via its anticodon site it then binds to the “right” nucleotide triplet codon for the “right” amino acid for that position in the forming protein. So we all know that the emergence of the code, which self consistently specifies the synthesis of the “encoded” protein enzymes that, by loading the right tRNAs, instantiate the “code”. This system is what I will call “collectively autocatalytic” , yet more. It is collectively autocatalytic in that virtually all steps are protein catalyzed reactions, save the ribozyme itself. If other RNA molecules play catalytic roles that does not obviate my point.

But the code IS more than just collectively autocatalytic, it is also, as O’Nuallian would insist, syntatic. Why?

The next point is that molecular reproduction does NOT depend upon template replication. Gonen Ashkenasy, after a post doc with Reza Ghadiri who had made the first self reproducing protein, made a set of nine peptides which forms a “collectively autocatalytic set”. Here each peptide catalyzes the formation of a second copy of the next peptide around a cycle of the nine different peptides. No peptide catalyzes its own formation, the set of nine peptides as a WHOLE catalyzes its own formation out of

exogenous building blocks. As such, it constitutes a Kantian Whole, where the parts exist (in the universe) for and by means of the whole. Organisms are Kantian wholes in their worlds, with a “functional closure, or better a functional sufficiency, with one another. We yet lack the concept of functional wholes, although autopoiesis comes close. More we can imagine and are not far, probably, from the spontaneous formation of collectively autocatalytic sets. Niles Vaidya and Niles Lehman made a system of halved ribozymes which could form hybrid ribozymes combining the recognition site of one with the catalytic site of another in a Mg^{++} solution and found the spontaneous emergence of a single autocatalytic hybrid ribozyme, then loops of 3, 5 and 7 collectively autocatalytic hybrid ribozymes. Of course these are evolved RNA molecules. Efforts are underway to randomize these RNA sequences and test for the spontaneous formation of collectively autocatalytic sets of RNA, or of stochastic peptides, or both. Placed in a budding liposome, one might get a protocell, that can evolve to some extent.

But to what extent? Here is O’Nuallian’s insistence on syntax. An RNA or peptide or both in a set of protocells will have a hard time evolving novel RNA or peptide or both or other molecules and having to maintain collective autocatalytic closure. In sharp and obvious contrast, once encoded protein synthesis via the genetic code had evolved, it became far easier to explore a wide range of novel RNAs and proteins, hence functionalities, which presumably strongly abetted the capacity of evolution to create novelty. The syntax of the code, law-like, is an enabling constraint that does not itself cause, but ENABLES far wider evolutionary exploration.

But now we need to include a new idea: Enable. O’Nuallian is close but does not discuss it explicitly. Much of evolution is enabled, not caused.

Second, I join O’Nuallain on 2. Mathematics and the theatre troupe are both in authentic dialogue with external reality. I borrow from Richard Melmon, who is, in fact, my close cousin, the idea already in Rousseau, not Hobbes, that language probably evolved from metaphoric to propositional. Assume this is true, or true enough. Perhaps as Michael Arbib argues, language evolved from gestures. That too will do. “Juliet is the sun!” Is this metaphor, so rich, either true or false in the sense in which the proposition: “The cat is on the mat” true or false? NO. Propositions are either true or false, Aristotle’s law of the excluded middle. “Juliet is the sun” is neither true nor false in the propositional sense. More, do you think any set of pre-stated propositions could exhaust the meanings of a metaphor such as “Juliet is the sun”? I think we all answer, “NO”. Pause...From propositions, true or false, we easily get logic: “All men are mortal. Socrates is a man. Therefore Socrates is a mortal.” The premises logically ENTAIL the conclusion. From entailment and number we get

mathematics, first number, then simple addition and subtraction in counting, then 0, then negative numbers, then the real line, then irrational numbers, then algebra with equations and variables, $X = Y$ squared, then analytic geometry, then differential and integral calculus, then topology then.....Ricci Tensors. Mathematics, so far, is derivative of entailment and propositions, bought at the price of carving the world into categories, “cat” and “mat” where, however, ostensive definitions are famously ambiguous.

Some musings: Could we mathematically PROVE that no set of propositions can exhaust the meanings of a metaphor? I think not. If mathematics derives from propositions, and if metaphors are not propositions, not true or false, how can we use true or false propositions to prove that no set of propositions can exhaust the meanings of a metaphor which is not “true or false”? If not, the world we know and live in, exhorted by metaphors, is rich in ways beyond propositions. I think all art, including the comedy improvisational troupe co-creating a skit they cannot prestate, is metaphoric, and often a co-creation none could know before-hand. So is evolving life.

Yet we also invented and do manipulate 4th order tensors. O’Nuallian and I would probably agree that the mystery of how we may invent and do this is not explained by consciousness itself, whatever and however that is.

One must love his 3, but only on some interpretations of quantum mechanics. Presumably this is not true for the multiple world interpretation in which measurement is not real. If real, I too love “participatory universe” rather as John Archibald Wheeler may have wished it, and Whitehead in *Process and Reality* tried for.

His 7: Biological explanation is teleological: The heart’s purpose is to pump blood. Yes, most of us agree. But how? The heart jiggles water in the pericardial sac, which is a causal consequence of the heart, as well as pumping blood. Why is one causal consequence the “function” of the heart the other causal consequences are not? This distinction, if acceptable, seems to render biology not reducible to physics, where ALL causal consequences (in classical physics) all happen. I think “function” is justified in biology basically because above the level of the set of atoms, most complex things will never exist, complex living things do exist as Kantian wholes, and the function of a part is its causal consequence(s) that help maintain the whole. Once, function, Darwin gives us a teleology without a designer, as we all want to believe, if not creation scientists.

His 16: evolution as a subset of emanations. Yes, Yes. Consider the evolution of diversity of the biosphere and the economy, the latter over the past 50,000 years as we pass from 10,000 goods and production functions to billions. How and why? Both

seem to be emanations into the very possibilities what the evolving biosphere or we have already created.

If I cannot “review” O’Nuallain’s book, I can close with two major issues he stresses. First, the academic-industrial complex. He is right, we are rendered good citizens, too much for the power purposes he stresses. Spirituality. We are so lost to it in our technocratic modern world of aps and zaps.

At the heart of this book I am unable to review in the sense of stating or summarizing, is O’Nuallian’s deep humanity. He longs for us to seek that full humanity, he longs to enjoin us, provoke us, evoke us, confuse us, poke us to awake. *One Magisterium* is a sprawling, confusing, provoking masterpiece.

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