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Comment

Are you (almost) a zombie? Conscious thoughts about "Consciousness in the universe" by Hameroff and Penrose

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In 1874, Thomas Henry Huxley argued that consciousness is a mere epiphenomena of (particular) physical interactions [4]. Today such issues are sometimes discussed using thought experiments involving philosophical zombies (hypothetical entities that look and act like humans, but lack consciousness) [5]. For example, one may ask if both zombies and humans are reducible to computations or algorithms running on (human-body-appearing) hardware. Indeed, many assume that human behavior and consciousness may be explainable in a mechanical-computable kind of way.

But Roger Penrose and others have developed arguments as to why consciousness must, instead, be hyperalgorithmic (not-computable) [1,6–11,13,14]. Just as scientific explanation no longer requires that the theory be deterministic, we should now ask if it should be required that the theory be mechanistic. Show your children various examples of numbers (using, say, apples and blocks and pennies) and they will come to understand the notion of numbers; we do *not* give our children a set of rules or algorithms in order to acquire such a notion. (A computer and a human would tackle the following task very differently: "Find an odd number that is the sum of two even numbers" [11].) Algorithms do not seem to capture human experiences such as red perceptions, sad feelings, creative insights, and our time-asymmetric decisions to struggle for truth, justice, and world betterment. Indeed, mathematical models do *not* have to be algorithmic! It seems there must be hyperalgorithmic laws of nature, as yet undiscovered.

Some additional positives (if they are positives) of a hyperalgorithmic approach – as specifically formulated by Penrose and Hameroff per their "Orch OR" theory of consciousness [2,10,11] – include the following: (1) "Orch OR" has a place for sub-conscious levels below human conscious intelligence and the possibility of super-conscious or trans-human levels above it. (2) "Orch OR" suggests an ontology not unlike process philosophy reminiscent of Whitehead, Hartshorne, Shimony… [3,12,15–18]. And, (3) "Orch OR" takes seriously the fact that not all of mathematics is algorithmic.

A so-called "technological singularity" identifiable with hyperalgorithmic super-consciousness (as distinguished from algorithmic super-computation) may be in our future. As Penrose puts it (p. 178), "it might be possible to have a conscious entity that is not biological at all, in the sense that we use the term 'biology' at the present time; but it would not be possible for an entity be conscious if it did not incorporate the particular type of *physical* process [hyperalgorithmity] that I maintain is an essential" [11]. If this is so, then perhaps the future may bring an expansion of consciousness rather than its extinction.

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