

Terrence Deacon's Incomplete Nature - Identifying the thermodynamic homunculus

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Abstract: This critique of Terrence Deacon's 'Incomplete Nature' is in 5 parts. In the first introductory part, I question the key concept of 'absentia' and then relate this to ideas of positive attraction in nature. Part 3 identifies the damaging homunculus in Deacon's argument. Parts 4 and 5 isolate some technical deficiencies in Deacon's understanding of thermodynamics.

1. Intro - Incomplete Nature is Deacon's Hierarchical Systems Model

Although not explicitly expressed as such, Terrence Deacon's 'Incomplete Nature' is a hierarchical model for explaining, through emergent process, how mind arises from matter. Deacon states,

Our ultimate scientific challenge is to precisely characterize this geometry of dynamical forms which leads from thermodynamic processes to living and mental processes, and to explain their dependency relationships with respect to one another. (p.44) [in other words to identify forms of dynamic processes and show how they relate hierarchically]

At some point in this hierarchy, the causal dynamics of teleological processes do indeed emerge from simpler blind mechanistic dynamics. (p.140)

constructing a theory of emergent processes... specifically requires developing new criteria for defining hierarchically distinct *dynamic regimes* and their relationship to lower-level dynamic regimes. (p.179)

Consequently, as a hierarchical systems model, Deacon is presenting a mechanistic, explanatory incarnation of the Hierarchical Construct Theory (HCT - sometimes referred to as the Hierarchical Systems Theory, HST) of consciousness. The concepts behind teleodynamic processes; emerging from morphodynamic processes; emerging from thermodynamic processes, is essentially an attempt at defining the hierarchical nature of the construction and therefore the confinement of dynamic systems. The emergence of novel characteristics are then associated with these dynamic processes which are then implicated as explananda of life and conscious. (A full account of the Hierarchical Construct Theory of consciousness can be accessed throughout this website).

2. Deacon's idea of *absentia* vs the concepts of intentionality and purpose

In contrast to Colin McGinn's harsh words (see end of this article), Daniel Dennett's review of Deacon's 'Incomplete Nature' ('Chicago Journal') is interestingly noncommittal,

What is missing from the computational approach now so dominant in biology and cognitive science? According to Deacon, it is, well, missingness. Absence does not just make the heart grow fonder; in many places at many levels absence marks the ultimately thermodynamic asymmetries that power evolution and life, and reactions to absence play the foundational causal role in mental phenomena. *'Aching Voids and Making Voids'*, *Chicago Journals*, <http://ase.tufts.edu/cogstud/dennett/papers/achingvoids.pdf>

But what does Deacon say of his "somewhat clumsy term *absentia*" (Deacon's own words, p.23)?

Each of these sorts of phenomena—a function, reference, purpose, or value—is in some way incomplete. There is something not-there there. Without this "something" missing, they would just be plain and simple physical objects or events, lacking these otherwise curious attributes. Longing, desire, passion, appetite, mourning, loss, aspiration—all are based on an analogous intrinsic incompleteness, an integral without-ness (p. 2-3)

Such concepts as information, function, purpose, meaning, intention, significance, consciousness, and value are intrinsically defined by their fundamental incompleteness. They exist only in relation to something that they are not. (p.23)
[Deacon's emphasis]

He extends the notion of *absentia* by saying,

What matters in the case of information, and produces its distinctive physical consequences, is a relationship to something not there. Information is the archetypical *absentia* concept. (p.373)

Because organisms are constituted by specially organized, persistent, far-from-equilibrium processes, they are intrinsically incomplete. In this regard, they are processes organized around absence. (p.416)

With the realization that specific absent tendencies—dynamical constraints—are critically relevant to the causal fabric of the world... we are able to stop searching for consciousness "in" the brain... (p.534)

The intentional properties that we attribute to conscious experience are generated by the emergence of... constraints—constraints that emerge from constraints, absences that arise from, and create, new absences. (p.535)

Rather than attempt to unravel the utterly incoherent thesis of *absentia* phenomena and concepts, in my critique of 'Incomplete Nature', I make a positive, and I hope more plausible account of behavioural purpose and intentionality in this article.

3 INTENTIONALITY: DENNET'S VITAL ERROR IS SEARLE'S CRITICAL OMISSION

Newton's Third Law of Motion

Newton's Third Law of Motion states: when one body exerts a force on a second body, the second body simultaneously exerts a force equal in magnitude and opposite in direction on the first body. This is how Deacon references Newton's Law:

we can draw a number of rough analogies between Newtonian dynamics and thermodynamics. First, the equilibrium state can be crudely analogized to a mass moving at constant velocity in a straight line, in the sense that a system in equilibrium is dynamically active, changing from state to state, and yet exhibiting no change in global (distributional) properties. Second, like a moving mass, a thermodynamic system at equilibrium will tend to maintain its dynamics within the same distributional parameters until perturbed: its maximum entropy state. Third, like the inertia of a massive body, a thermodynamic system at equilibrium will resist being modified, with a degree of resistance proportional to the size of the collection of molecules that constitute it. (p.209)

Consider scenario 1: a space where two bodies (A and B) collide:

When body A and B collide (as of Newton's third law), how do they 'know' how to respond? In other words, what 'tells' object A, that the mass of object B with which it has collided is, for example, 5 times greater and consequently that it must respond by rebounding at such and such speed and angle? What *information* do bodies A and B access such that they can respond according to Newton's law, and furthermore, what are the intentions of object A and B in behaving as they do? In view of these questions, the first point I wish to make is that interaction can be interpreted as some kind of negotiation: in this example the consequential behaviour is the summation of negotiated relative mass. The purpose and intention of the negotiation, therefore, is to arrive at an equitable compromise—a state of equilibrium. If one is to say anything of their intention and purpose therefore, it is that they *seek equilibrium through their negotiated compromise*.

The second point, is that when two independent bodies interact with one another, the ensuing reaction is always indicative of their expressive differential and consequently, there must be some 'knowing' informative principle at work—an 'endowed physical propensity' that directs their action (see 'problem 2 - Positive Attraction' below). That there is physical 'information' guiding behaviour ensures that such things as atoms do interact meaningfully.

I suggest that Newton's Third Law of Motion is the axiom underpinning the intentionality of all systems-constructs. That this principle applies to all systems-constructs is pertinent to Deacon's entire thesis given what he writes on page 209 (quoted above) inasmuch as we should consider intentionality, at all levels, as *an interactive redress* and not as a absence: interaction is a stabilising positive dynamic process whose complexities (in action) can be described hierarchically, both in terms of emergence and evolution. In contrast, Deacon expresses the view that the term 'intentionality' carries too much "mentalist" baggage:

Unfortunately, because it is not just mentality that exhibits intrinsic incompleteness and other dependence, the terms *teleology* and *intentionality*... are burdened with numerous mentalistic connotations. (p.26)

Consequently, Deacon coins an alternative term; ‘ententionality’:

Ententional phenomena include functions that have satisfaction conditions, adaptations that have environmental correlates, thoughts that have contents, purposes that have goals, subjective experiences that have a self/other perspective, and values that have a self that benefits or is harmed... all also have an orientation to a specific constitutive absence... something that is their critical defining attribute. (p.27)

As I have argued above, all systems-constructs have positive purpose: why can we not say of an atom, that it is *satisfied* in its expression of equilibrium following a reaction with another atom, that a hydrogen atom forming in the nuclear fusion of a star is a condition of temporal satisfaction expressed through the interactions of its subatomic particles, or that colliding bodies demonstrate *purpose* in their negotiated momenta. The following quotations indicate that there really is nothing distinctive about “ententionality” that cannot be understood in terms of purposeful condition-satisfying “intentionality” in all forms of systems-constructs given that all systems-constructs appear to have positive purpose.

I propose we try to understand how they [ententional properties] could have come into existence where none existed before. (p.138)

all ententional phenomena are defined with respect to order, and so depend on the presence of organized processes for their existence. (p.181)

dynamic organization provides sufficient justification to consider its implications for the emergence of ententional phenomena. (p.308)

3. Deacon’s problematic account of containment and constraint

Whilst considering the 2nd law of thermodynamics, we need not entertain Deacon’s notion of “absentia”—of something missing. We need consider instead the notion of the intention and purpose of negotiated compromise in delineated physical bodies.

Consider scenario 2: a space where vast numbers of elemental bodies collide

Every individual interaction, in the Newtonian scenario 1 above, is resolved through a negotiated compromise toward a state of equitable equilibrium. But note from Newton’s third law (‘when one body exerts a force on a second body, the second body simultaneously exerts a force equal in magnitude and opposite in direction on the first body’), that following interaction, the exerted force is in the “opposite direction”. This opposition ensures that the intention and purpose of these bodies leads inexorably to dissipation: there can only be dissipation, unless there is some kind of circularity to their interactions by virtue of ‘containment’. Consequently, we arrive at two problems:

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Problem 1 - Containment

What creates the containment? What creates the confines that ensures repeated collisions toward a 'unified dynamically stable state' that is in equilibrium?

Problem 2 - Positive attraction

What is the "endowed physical property" of these bodies (from quote above) that they negotiate fairly and equitably with one another?

The problem of containment

The second law of thermodynamics states: the entropy of an isolated system never decreases, because isolated systems always evolve toward thermodynamic equilibrium. Thus the second law is about entropy in isolated conditions. In nature however, there are no indefinitely isolated conditions – the pursuit of an 'ultimate and absolute' equilibrium is inexorable. Nevertheless, temporal constraints do arise (and emerge!) in physics. Identifying the nature of these constraints is an important aspect to Deacon's account. However, Deacon's assessment of these constraints is extremely narrow and exacting. He states that

Morphodynamic processes are the *only* spontaneous processes that generate and propagate constraints... (p.315) [emphasis added]

and that,

constraint is a negative property (p.418)

constraint is not something positive, but is rather something not realized (p.425)

Intrinsically emergent constraints are neither material nor dynamical - they are something missing. (p.535)

Are we to believe that this obscure account—identified and articulated by Deacon as, exclusively, a "morphodynamic phenomenon" in nature—arises because of thermodynamic processes, and that we can then extrapolate this concept upward (hierarchically) to explain consciousness and mind? Surely on this account, we must therefore be forced—since "morphodynamic processes are the only spontaneous processes that generate constraints" (p.315)—to extrapolate this concept downward (hierarchically) too: to the very bodies, particles, or molecules that make up the thermodynamic milieu from which these processes are said to originate. This sounds like a *homunculus of an argument*: is it thermo/morpho/teleodynamic turtles all the way down as well as all the way up (<http://mind-phronesis.co.uk/Turtles-all-the-way-down.pdf>)? Are there no other fundamental forces and constraints that need be considered?

The problem of positive attraction

What is the "endowed physical property" of these bodies that they should negotiate fairly and equitably with one another?

Deacon gives no account of the forces of constraint that determine the very existence of the bodies, particles, or elements, that invoke the thermodynamic conditions that he is eager to explore: there is no account of 'positive' forces of attraction i.e., there is no

mention of the four fundamental interactive and essentially positive (attractive) forces of nature. Rather, attraction toward constraint is explained purely in terms of absentia:

Constraint is the fact of possible states not being realized, and what is not realized is not subject to componential analysis. (p.204)

Attraction in this sense is not an active process or the result of a force. It is merely the result of the statistical asymmetry of optional states. (p.230)

Whilst Deacon's account relies on the physical properties of the atomic components that cause the behavioural phenomena of thermodynamics, there is no exploration of 'what it is' for such atoms to have the properties that lead to these dynamic phenomena in the first place beyond the "clumsy" concept of "absence" (his words, p.23).

Thus, whilst not unequivocally discounting Deacon's theories, it needs to be stressed that containment need not be explained *only* by morphodynamic processes. There are the fundamental forces of nature too. For example, the strong nuclear force, which actively (positively rather than absently) 'hold' atomic particles together, and the cohesive forces among liquid molecules, which are responsible for the phenomenon of surface tension, are critical to the structures of life. Who is to say, there is not a fundamental attractive force in nature too, that accounts for consciousness: perhaps there is a positive psychophysical force yet to be discovered

4. Deacon's unqualified account of emergent phenomena and emergent properties

Consider scenario 2 again: a space where vast numbers of elemental particles collide. The manner in which the particles interact is determined by their properties: they are, in themselves, contained constructs with certain exacting properties, for if they were not contained they would in some way fuse (perhaps chemically) with one another. A quantity of individual particles such as these may give rise to a unified systems-flow causing novel behavioural phenomena but such a systems-flow does not usually possess novel properties. Any thermodynamic consequences, be they merely distributional or novel emergent macroscopic features, are behavioural phenomena i.e., the behavioural *phenomena* are determined by the exacting *properties* of the particles involved. Or, as Jerry Fodor writes in his dazzling review entitled, 'What are trees about Incomplete Nature review', <http://emergence.org/Fodor-Deacon-LRB.pdf>:

I strongly suspect that Deacon frequently confuses strictly emergent phenomena (if there are such things) with merely statistical properties of aggregates. (p.4)

Thus 'the emergence of properties' and 'the emergence of phenomena' are completely distinct concepts governed by different principles: true systems-constructs possess interactive functional properties that give rise to purposeful behaviour and intentionality; whilst systems-flows display behavioural phenomena, which, I hesitate to suggest, Deacon might describe as absentially constrained but which are determined by probabilistic tendencies. In a way, Deacon uses thermodynamic principles to repeatedly jump into and out of bed with systems-constructs versus systems-flows concepts; with

behavioural properties versus behavioural phenomena; with intentionality versus ententionality; with absence versus presence.

5. Deacon's misappropriation of the Second Law of Thermodynamics

Deacon misinforms his readers with the following:

The second law of thermodynamics tells us that, all other things being equal and without outside interference or loss (or more specifically, in a hypothetically isolated physical system in which energy neither enters nor leaves), entropy will inevitably tend to increase until it reaches this maximum.... At this point we say that equilibrium has been reached.... Apparently, however, living and mental phenomena violate this presumably universal law. (p.108)

These enigmatic features of the living world are in fact hints that there must be a loophole in the second law. (p.109)

This is a very similar point I have highlighted in some of my own work:

Schrödinger (1944) makes the observation that whilst the laws of physics “have a lot to do with the natural tendency of things to go over into disorder... it is by avoiding the rapid decay into the inert state of “equilibrium” that an organism appears so enigmatic.” (Chap. 6 para. 2 and 6, ‘What is Life?’ - http://whatislife.stanford.edu/LoCo_files/What-is-Life.pdf) (Pharoah, 2003 - ‘Looking to systems theory for a reductive explanation of phenomenal experience’ <http://homepage.ntlworld.com/m.pharoah/reductiveexplanation.html>)

Alternatively however, I balance this seeming inconsistency,

Pieper (2000 ¶ 5 ‘Entropy, Disorder and Life’ - <http://www.talkorigins.org/faqs/thermo/entropy.html>) points out that the synonymous use of the terms entropy and disorder represents a serious misunderstanding of what thermodynamics actually states. Undoubtedly, because order evolves from disorder in complex physiologically diverse environments, [rather than isolated conditions as is stipulated in the 2nd law] it can be given that the evolution of ordered systems reinforces rather than conflicts with thermodynamic principles, as Boltzmann implies (1886/1974 - The second law of thermodynamics. In B. McGinness (Ed.), Theoretical Physics and Philosophical Problems) and Feynman et al. (1963 - ‘The Feynman Lectures on Physics’ - <http://www.feynmanlectures.caltech.edu/>) demonstrate.

In other words, the view expressed by Deacon is a common misappropriation of the 2nd law that individuals like Pieper, even now in the 21st century, feel need to redress. Note, there is no loophole.

Conclusion - Re-interpreting Deacon's vague impressionism

One of the complaints of 'Incomplete Nature' is the lack of referencing to other people's work. In my view, Terrence Deacon writes in a style that makes him seem to be the originator for many of the expressed ideas, regardless of whether the ideas are his or not.

One would never think from reading *Incomplete Nature* that the author's main contentions have already been systematically developed by others, and that there is in fact hardly an original idea in the book. Two works, in particular, stand out in the prior literature: *Dynamics in Action* by Alicia Juarrero and *Mind in Life* by Evan Thompson. Neither book is cited by Deacon, although they cover much the same ground as his—far more lucidly and insightfully. *Colin McGinn NYRB*

See also: Chronicle of Higher Education - <http://chronicle.com/blogs/percolator/stolen-ideas-or-great-minds-thinking-alike/29306>

Seth Robert's blog - <http://blog.sethroberts.net/2013/02/05/alicia-juarerro-on-the-terry-deacon-report/>

My feeling is that if *Incomplete Nature* were referenced adequately and the arguments made succinctly, the work would be less impressionistic; the ideas expressed not so intangible. I suppose, the missingness bothers me. But then, had it been written with greater clarity and with the necessary references, the work would have been too similar to Alicia Juarrero's 'Dynamics in Action', pdf - <http://mind-phronesis.co.uk/dynamics-in-action-Alicia-Juarrero.pdf>. I remain puzzled as to why Terrence Deacon wrote a book that looks at times to have used Alicia Juarrero's book as a template and then tried to disguise this by being vague and flowery.