Who We Are II:

Further Reflections on Human Self Being

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Abstract

Some modern philosophy seems to assume that our human subjective experience is an illusion. The same is said about free will and any sense of meaning and purpose that we may experience. Most of these conclusions seem to be based on the prior assumption that modern physics explains all that there is, and that physics rules out such things as choice, value, and free will. Unfortunately (or fortunately depending on your perspective) there seems to be little if any ground for accepting these assumptions. There are some real issues involved in understanding who we are, but they need not be founded on unnecessary assumptions from physicalism.

In WHO WE ARE (Collegium 2001) I talked about the interpretive nature of the self and about how the insights of Damasio and Heidegger seemed to fit well with the ideas I have been exploring. Continuing these explorations, I would like to review some other recent writings on this subject, and to further develop my own hypotheses.

There is a dialogue in the June 2008 issue of the AAR Journal which raises questions about the status of our understanding of self. There is also a treatment of this question with a particular proposed hypothesis in the June 2008 issue of Zygon. In both cases the key issue has to do with the implications for understanding self and soul against the background provided by modern science. A number of recent books have dealt with this issue as well. In particular I note the work of Robinson, Chalmers, Kauffman, and Deacon, and find that the ideas of Laughlin and Polkinghorne bear on this question in interesting ways.

Robinson does a good job of pointing out that the physicalist theories are assumption driven. Chalmers points out that even if those theories were sound, there remains an issues of first person experience that needs to be explained. When we drop the physicalist assumptions, Chalmers ideas point us in an interesting direction. Laughlin's observations about what physics does and does not tells us can help with these ideas.

The idea of emergence helps to pull the whole picture together. I would speculate that consciousness emerges from life, and that self and soul emerge from consciousness.

This emergence takes place against a background of significance and value. The background is found in the impetus towards complex structure which seems to be pervasive within the world.

Consciousness, Subjectivity & Soul:

Recent Treatments of this Problem:

Dialogue in JAAR – Slingerland re Cho & Squier

There is a dialogue in the June 2008 issue of the American Academy of Religion Journal that brings up some of the central issues in modern philosophic treatments of the human self. Edward Slingerland opens this dialogue with a paper entitled "Who's Afraid of Reductionism? The Study of Religion in the Age of Cognitive Science"[1]. The response to Slingerland, entitled "Reductionism: Be Afraid, Be Very Afraid"[2] is by Francisca Cho and Richard Squier. These opening papers are followed by a series of rejoinders by these same authors. Slingerland takes a position which is based on the dominant scientific paradigm and tries to show how that can be reconciled with a more humanistic outlook. Cho and Quier give voice to the concerns that such reconciliation efforts do not really work, and that the scientific paradigm would make many basic humanistic and religious concerns moot.

Slingerland starts out by arguing against extreme post-modern relativism which seems to deny any reference for truth claims apart from cultural norms. This is the kind of argument that claims all of our attempts at scholarly analysis are always and only a series of comments and interpretations built on prior comments and interpretations. Thus it is 'text' all the way down, and is a function of whatever history the current thought is built upon. This line of thinking has concluded that what we take as truth is, and can only be, socially constructed opinion and calls into question any philosophic claim about reality derived from such opinion. Some would argue that the very notion of 'reality' is called into question.

Kuhn presented the most well known criticism of scientific thinking, suggesting that scientific paradigms are also cultural artifacts. Slingerland points out that there are alternatives to Kuhn's denial of any final reference for the sciences, alternatives which support forms of pragmatic justification. He is basically arguing that our common sense

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[1] Slingerland, Edward; "Who's Afraid of Reductionism? The Study of Religion in the Age of Cognitive Science"; Journal of the American Academy of Religion, June 2008, Volume 76, Issue 2; page 375.

[2] Cho, Francisca and Squier, Richard K; Journal of the American Academy of Religion, June 2008, Volume 76, Issue 2; page 412.

notion of reality is in line with what science and modern technology are showing us. He also suggests that we should take seriously the idea that the human self is founded in an organic body and in the physical world. He points out that existentialists and post-modern claims that we culturally create our own values ignores that background of value and meaning founded in the physical world and in the process of evolution that brought humans and their culture into this world. Slingerland suggests that we should accept a basically pragmatic model of truth verification that uses reference to our embodied selves and our physical environment.

Slingerland says we should accept the growing consensus from the cognitive sciences that the mind is an emergent function of the body and that the body is permeated through and through with mind. Thus mind is not some mysterious additional entity but is an emergent property of matter when that matter is arranged in appropriate and sufficiently complex ways.

In this model, religion is another aspect of human behavior as an integrated mind/body whole, and like all of the rest of human function and behavior is an outcome of evolution. The human person and all of its aspects are an outcome of the underlying laws of nature, not something that stands apart from the rest of nature.

On page 382 he writes:

> *… The process of evolution ensures that there is a tight fit between our values and desires and the structure of the world in which we have developed… Of course, human beings are apparently unique among animals in possessing the cognitive fluidity and cultural technology to effect some radical changes in what gives us pleasure, what we find worth pursuing, and what we deem as meaningful. But all of this cognitive and cultural innovation is grounded in - and remains ultimately constrained by—the structure of our body-minds.*[3]

He goes on to spell out the character of those constraints as he sees them: (pages 382-3)

> *… It is important, though, to fully confront the implications of the embodied model of the human mind. To wit: the human mind is coterminous with the human body (especially the brain), and this body—brain is no more than a very complex physical thing, a product of millions of years of evolution. Human thought is not a ghostly, disembodied process, but rather a series of body—brain states—a series of physical configurations of matter—each causing the next in accordance with the deterministic laws that govern the interactions of physical objects.*

A key aspect of Slingerland's position here is that he accepts the idea that the natural world is a fully deterministic world, and as parts of this natural world we too are fully determined beings. There is no such thing as free will, and our conscious experience does not make a difference in the physical determinism that governs our body—brain—

[3] Slingerland; *op.cit.*

mind.

Slingerland accepts the idea that that as we move up the ladder of complexity in physical structures, what appear to be new entities emerge. These new entities exhibit properties that could not be predicted based on what we know about their less complex constituents. Thus there are laws of organic chemistry that cannot be fully predicted from what we know about physical chemistry, and laws of biology that cannot be fully predicted from what we know about organic chemistry. However he denies the notion that higher level complex structures may have a downward causal influence on their less complex constituents. He accepts the argument that all causation is from the lower to the higher in complexity and never the other way around. Based on this, reduction to lower levels of structure is always a valid mode of explanation, and is ultimately the best mode of explanation. The limitations on prediction are merely the consequences of complexity and not fundamental.

However, he also recognizes that there is an innate tendency for us to see ourselves as agents, that is as beings who act out of reasons based within themselves, and who are thus both free and responsible in such actions. He thus accepts that we will probably never dispense with such a theory and replace it with a functional belief that our actions are all pre-determined. Slingerlands position is that while we are pre-determined, we are also pre-determined not to see ourselves that way. As he puts in on page 397:

> *We will thus apparently always see meaning in our actions—populating our world with "angry" seas, "welcoming" harbors, and other human beings as unique agents worthy of respect and dignity, and distinct from objects in some way that is hard to explain in the absence of soul-talk, but nonetheless very real for us. We will continue to perceive our work, families, and lives as being "meaningful" at some inchoate level, and be strongly motivated to make the appropriate changes whenever we begin to lose this sense.*
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> *Qua physicalists, we can acknowledge that this feeling is, in some sense, an illusion. For better or worse, though, we are apparently designed to be irresistibly vulnerable to this illusion. In this respect, Appearance is Reality for us human beings. This is where, in fact, we see the limits of a thoroughly "scientific" approach to human culture, and need to finesse a bit our understanding of what counts as a "fact" for beings like us.*[4]

This leads Slingerland to accept the basic idea of our human existence expressed by Charles Taylor when Taylor says that we by our very nature exist within a realm of values and meanings. Slingerland, however, does not mean this in quite the way that Taylor had in mind. For Slingerland the realm of values and meanings is an unavoidable illusion stemming from the evolution produced character of our physical beings. Since it is an unavoidable illusion, Slingerland says that we must accept this as part of our 'human reality' while recognizing at some level that it is not ultimately real. It remains

[4] Slingerland; *op.cit.*

the case for Slingerland that the realm of moral and value space is a part of our lived reality due to the constitution of our natural being.

Cho and Squier, in their response to Slingerland, assert that the moral and value consequences of his view are too devastating for it to be accepted. They suggest that statements like ‘consciousness is an illusion’ are empty of real content since only consciousness is subject to illusions. Such statements are philosophical assumptions masquerading as science.

One thing that Cho and Squier do not do is to address the issues raised by Slingerland’s claim that human beings are a part of a strictly deterministic natural world, and that as such they cannot have any property that would align with what we call ‘free will’, and the conscious experience of such beings cannot be seen as a causal element in their behavior. It is hard to find a way around Slingerland’s assertion that morals and values generally are illusory if that claim is accepted. And I would agree with Cho and Squier, once it is accepted that the realm of values is a human illusion it is hard to continue to take such issues seriously.

Cho and Squier imply that the claims of science in that regard are social constructs. They adopt the position that Slingerland rejected, that science along with all of the rest of human culture, is a linguistic construction and not a firm description of a discovered reality. The evidence of the success of science and technology in predicting events and allowing the construction of working devices (computers, airplanes, television, etc.) makes this position seem rather weak.

Slingerland’s position, that we humans are fundamentally embedded in this natural world, and need to accept the inputs from the sciences that explain the character of that world and our position in it is one that I agree with. His insistence that the sciences show us to be strictly determined by bottom-up physics is, I believe without justification. It seems to me that the strength of Slingerland’s argument comes from his implicit claim that we have only two choices. Either we accept the extreme post-modernist claims that all human knowledge is socially constructed opinion, or we accept the position of those who tell us that the whole of reality is to be accounted for by deterministic scientific laws. If we accept the post-modern position as a critique of the claims of science then we have no base for a real understanding of our world, and we are limited to the claims and counter claims of various culturally constructed beliefs.

I believe that this dichotomy is not our real situation. I will try to show that there is a middle ground that takes science seriously without denying the causal significance of our conscious experience and our sense of having a free will. Much of the modern philosophic writing in this area claims in one way or another to be an attempt to correct errors that arose from the ideas of Rene Descartes. This critique of Cartesianism is found on both sides, those who support the more extreme forms of post-modern relativism and those who agree with Slingerland in supporting a view which denies the significance of conscious experience. Daniel Robinson presents a useful review of Cartesianism and its critics.

Cartesianism Revisited – Daniel Robinson[5]:

Robinson starts out by noting that much of modern philosophy refers to the problem of consciousness, or the 'mind-body' problem as something new to philosophy, something which was not treated by the ancients. He makes the point that this is either an error of interpretation of the ancients, or perhaps a misunderstanding of what is peculiar about our more recent thought. Both Plato and Aristotle addressed issues having to do with the differences between thought and physical events. They did not, however, see these differences as presenting a deep metaphysical problem. It has come to be seen as such a problem by virtue of the belief that the whole of reality can be explained by reference to physical science. Once that belief is accepted, the difficulties of explaining mental phenomena on such an assumption present us with unique philosophic problems. As he says on page 14:

> *That Plato and Aristotle did not consider mind-body issues within the framework of dogmatic physicalism does not render their position dated or simplistic. Rather, it stands as a challenge to dogmatic physicalism and offers as the very terms of the challenge the seemingly nonphysical properties of mental life.*[6]

It has become commonplace to claim that one essential task of modern philosophy is to free itself from the errors introduced by Descartes. Of these errors, Cartesian dualism is generally taken to be the chief culprit. But just what was it that Descartes claimed that we now see to so clearly in error?

The modern assessment of Descartes position has been that he asserted that while human bodies are physical objects in space subject to mechanical laws, human thoughts are neither spatial nor subject to mechanical laws. This separation of the mental from the influence of the physical is the key element of Cartesian dualism which is so roundly criticized in modern thought. The success of neuro-science in accounting for much of what was thought to be purely mental coupled with the difficulties of showing how a mental realm could affect things physical, is offered as a central argument against dualism.

Robinson tries to take us back for a re-examination of what Descartes said, and why he seems to have said it, and a comparison of the Cartesian position with some of the various accounts that are given to explain consciousness in modern works.

The key factor that set Descartes apart from his contemporary critics was his insistence on a mechanistic view of everything apart from consciousness. For Descartes, the human body was included in the physical realm which should be explained mechanically. In many respects his ideas did not differ that much from those of the modern neuro-scientists, except that he found a residual problem which was unaccounted for by the mechanistic approach.

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[5] Robinson, Daniel N; Consciousness and Mental Life; Columbia University Press, New York, 2008;

[6] *Ibid.*

In particular, Descartes looked at the physical world as something to be explained in the manner of mathematical ideas. He saw mathematics as the premier example of the kind of thought that could lead to definite and certain conclusions, not just opinion and probabilities. However, the domain of mathematics was clearly not to be found in the physical world. To justify turning to logic and mathematics as the primary mode of explanation there must be another realm in which pure thought could reside. Thus we have Descartes dualism. There is little if anything in modern scientific explanations of consciousness that would serve the need of founding a realm or analytic thought. In fact it is hard to grasp how such accounts of human consciousness claim to account for scientific and mathematical thought. Robinson makes the point that little has changed between the thinking of Descartes and of those who claim to refute him.

Most modern attacks on 'Cartesianism' are really defenses of physicalism. Descartes would have agreed with much of the sentiment, but he found no way to make the bridge from a mechanistic physical world to the kind of thinking he found in logic and mathematics. Since it is clear that humans who have physical bodies also engage in logical thought he found it necessary to accept that physics cannot be complete. There must be some interaction between a mental and a physical realm. The moderns have adopted the assumption that physics is complete without fully addressing the problem of how one then accounts for the very type of philosophic argument that expresses their theories.

The Problem of Phenomenal Experience – David Chalmers:

Another aspect of the problem of consciousness has come to the fore in modern thought. That is the issue of qualitative experience, our experience of the quality of various sensations and ideas. This is sometimes identified as the problem of 'qualia', things like the felt quality of sound, color, being happy or afraid, etc. This was captured in an oft repeated phrase by Ernest Nagel when he said, 'there is something it is like to be a bat', and similarly to be human, and there seems to be only first person access to that 'something it is like', the felt quality of experience.

This issue of phenomenal experience has been developed in a very clear manner in the writing of David Chalmers[7]. Chalmers has argued that this issue of what it feels like, the issue of phenomenal consciousness, is the really hard problem of consciousness. He is distinguishing this from what might be seen as 'easier' problems such as showing how there might be a mechanistic explanation for the path between certain sensory input and certain behavioral consequences (Chalmers doesn't address the question of rational thought as raised by Descartes and Robinson). This type of mechanistic explanation doesn't get to what Chalmers calls the 'hard' problem of consciously felt experience.

Chalmers starts out with an extended argument to the effect that there is no way to explain consciousness by means of the kinds of things dealt with in current physical theory. Conscious experience is simply unlike any of these things and at best we can

[7] Chalmers, David J; The Conscious Mind: In Search of a Fundamental Theory; Oxford University Press, New York and Oxford, 1996.

draw some analogies and comparisons but none of these rises to the level of explanation. We even find it difficult to define consciousness. We seem to be dealing here with what logicians might call a primary concept of the kind that cannot be defined in terms of other types of concepts.

At the same time, Chalmers, like Slingerland, assumes that physical theory is causally closed, essentially complete, and fully deterministic. This leads him to some strange conclusions. One of the strangest, although logically quite consistent with those assumptions, is the idea of a *zombie twin*. Our physical behavior is part of the physical world, and if physical explanation is closed and complete, then all of our physical behavior must be explainable from physical causes with**out** reference to anything outside of this system of explanation. Consciousness is, he maintains, something outside of this system of explanation, and thus it would be possible to have a non-conscious physical twin identical to one's self in all respects except that it lacked consciousness.

This *zombie twin* according to Chalmers would not only act in ways that our bodies act, but that would include speaking and writing. Thus Chalmers' book could have been written by his zombie twin. The notion that a zombie twin without conscious experience could author a work such as that would, to me, completely undermine the very idea of rational argument. There is nothing about particle level physics that would be incompatible with the argument "If all men are mortal and Socrates is a man then frogs must be kings".

The only difference between Chalmers and his zombie twin would be that Chalmers has first person felt conscious experience and the zombie twin does not. The only evidence that Chalmers has conscious experience is what he says and writes, which could also have been said and written by his zombie twin. The real evidence for consciousness turns out to be, for each of us, our own first person experience.

Since the experience of consciousness is undeniable yet he believes unexplainable in terms of current physics, this leads Chalmers to the notion of property dualism. He concludes that consciousness is due to a property of our organism which stands apart from those properties accounted for in the theories of the physical sciences.

Chalmers proposes that information is the element within physical material which carries this extra quality.

He starts out with a definition of information based on Shannon's analysis of communications systems. In this sense, information is simply some abstract set of options selected from a wider range of possibilities. This can be connected with a physical system where the states in question are identified by some causal relation (such as switches that cause a light to go on or off, or marks on a CD or DVD that cause an optical reader to generate an electrical impulse)

He then notes that there are similar cases of what we think of as 'information' in phenomenal experience. Here he is talking about patterns of visual or audible qualia. Chalmers believes that in general we can find a parallel set of physical states wherever we find a set of phenomenal states. Thus there are neural correlates to our visual and audible sensations, etc. This leads him to suggest that there may be a general rule that something we could think of as a psychic state always exists in parallel with set of

physically realized information in at least some kinds of physical systems, brains being a key example of this type.

Since he assumes that physical theory is causally complete and deterministic, he can only conclude that our consciousness plays no additional causal role in the world that could not be accounted for by the causality stemming from purely physical causes. This position certainly appears to be one of epiphenomenalism. Chalmers presents a number of arguments to soften the image of epiphenomenalism, but none that actually separate his position from that one.

John Searle[8]:

Searle says that consciousness is simply a biological function of brain states not unlike the way digestion is a function of our body chemistry. He says that consciousness must be functional because it makes no sense that evolution might have produced something as complex as consciousness if it did not serve a purpose, and that choosing among alternative possible behaviors seems to obviously be what consciousness is good for.

He says that consciousness is simply a function of brain states which are made up of neural structures and that no further explanatory assumptions are necessary. We merely need to develop better understanding of how brains produce consciousness. At some points he suggests that there may be new hypotheses needed to expand physical explanation in a way that will allow explanation of consciousness, somewhat like that way Maxwell's electro-magnetic theory expanded classical physics. This might imply that he thinks such further hypotheses would open up space for real theories of conscious choice and free will, but he doesn't spell out any such notion.

Owen Flanagan[9]:

Owen Flanagan is one who holds that neuro-science is on the road to a full explanation of consciousness, but does not hold that consciousness is epiphenomenal nor that free will is an illusion. He does maintain that there is no such thing as 'metaphysically free will', by which he means that we do not possess immaterial souls that are capable of acting without reference to the causal chain that affects physical things. Flanagan believes that our conscious selves are a manifestation of our physical brains, and that the process of choosing among alternatives that we engage in consciously has physical correlates in our neural brain structure. He dismisses Chalmers argument that consciousness cannot be accounted for by neuro-science.

By implication he seems to say that we are not subject to mechanistic

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[8] Searle, John R; Consciousness and Language; Cambridge University Press, Cambridge, and New York NY, 2002.

[9] Flanagan, Owen; The Really Hard Problem: Meaning in a Material World; MIT Press, Cambridge Massachusetts, 2007.

determinism, and yet he doesn't quite explain what sort of limitation there might be in physical determinism. He writes on page 107:

> *The naturalistic picture of persons is not inherently deflating or disenchanting. The reason it is not deflating is that it accepts and thus does not deny that we are conscious and that consciousness gives us some control over how we live. The reason it isn't disenchanting, at least not necessarily, is that our remarkable powers as persons remain. We are creatures who can and sometimes do make sense of things and find meaning. Our nature and our powers are explained, perhaps, but they are not eliminated. Furthermore, the almost unimaginable complexity of naturalistic explanations or explanation sketches of our kind of being reveal the beautiful depth, texture, and intricacy of our being, even if they remove whatever undeserved enchantment comes from mystifying analyses with numerous slots for the variable "and then the miracle occurred."*[10]

Flanagan presents a picture in many ways similar to what I would like to present, but I keep having the feeling that he is somehow faking it. He doesn't quite show how he escapes from the deflating or disenchanting aspects of the scientific account. Much of what Flanagan says about how we humans fit into the natural realm is very similar to what Chalmers has to say. The difference is that Flanagan dismisses Chalmers concern that consciousness is too unlike anything physical for physical explanation to cover it. Flanagan says that conscious experience is the first person correlate of neural processes and without describing the first person aspect one hasn't fully described those phenomena. Thus Flanagan would say that there can be no such thing as a *zombie twin* because the bodily processes of our organism, neural brain states in particular, by their nature involve conscious effects. In that respect physics is not complete because in itself as presently constituted it does not describe the first person aspects which are a part of some organic processes.

What is not clear here is whether Flanagan holds to the idea of determinism and/or to the idea that all causation is bottom up. Some of what he says suggests that he does, and nowhere that I can see does he clearly say anything contrary to that. If neural processes cause our conscious experience from the bottom up, it is hard to see how what we experience as decision making is not an illusion whether or not we could have zombie twins.

Terrence Deacon[11]:

Deacon says that consciousness evolves from prior life structures but does not seem to address the question of how physical determinism affects the assumptions involved in dealing with life and consciousness. He introduces the very suggestive idea

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[10] Flanagan; p.107.

[11] Deacon, Terrence W; The Symbolic Species: The Co-evolution of Language and the Brain; W.W. Norton and Co, New York, 1997

that as evolution leads to various stages of emergent phenomena, highly structured organic systems introduce a form of explanation dependent on structure and teleological in form.

In contrast to some other modern thinkers, Deacon again raises the issue of rationality. For Deacon the special attribute of human thought, apparent in the structure and use of language, is symbolic thinking. By symbolic thinking he has something else in mind from simple sign-object structures. What goes on in human thought and human language is more than just assigning verbal signs to various objects and actions. It is, rather, the development of a system of interconnection among a set of signs that can then be applied as an intentional net to some area of experience in the world.

This kind of structure among the signs allows thought to lead us to predictions about what may be found in the world that would never arise from a set of sign-object correlations by themselves. This is, at least to some degree, the same kind of issue that both Descartes and Aristotle raised in their claims that it was rational thought that set humans apart from the rest of the animal world.

Deacon argues that the need for such a system of symbolic connections and thought structures may have come about in the social relations among primitive humans, and that this may have been a key factor in the evolution of such thought among our ancestors.

Deacon also brings the old Aristotelian notions of cause (material, formal, efficient, and final) back into view with new science related specifics[12]. Material and efficient cause can be easily related to modern science as matter and force or energy. Deacon suggests that in some events we should look at the notion of form, or ‘morphodynamic’ cause and purpose or ‘teleodynamic’ cause. There are clearly some situations were form or shape strongly influences events (see Laughlin below), and in the case of living things it makes sense to look at many evolutionary processes in terms of ‘purpose’. In both of these cases, thermodynamic energy is a prerequisite for the functional effects to be realized.

Deacon uses these two additional categories of causation in his notion of emergence.

Again, as when I read Flanagan, I am not sure just how to take what Deacon says. If morphodynamics and teleodynamics are tied into some aspect of structurally based top down causation then he is describing a structure very different from that which Slingerland and Chalmers have in mind. If morphodynamics and telodynamics are summary descriptions of processes that are bottom-up driven, then I see no real difference.

[12] Deacon, Terrence W; “Emergence: The Hole at the Wheel’s Hub” in The re-emergence of Emergence; edited by Philip Clayton and Paul Davies;

How Complete is Physics?

Laughlin[13]:

Some have argued that QED (quantum electrodynamics, or the standard theory of particle physics) is a theory of everything. At present QED and general relativity have never been brought together, so we have two well established scientific theories that between them perhaps can claim to cover everything. However, there are some basic limitations to this claim. Laughlin points out that physical theory is not nearly as complete as the physicalists would have us believe. He says that the QED theory of everything has basic limitations that do not allow it to explain much when you move to more complex structures. A key factor here is that the equations become too complex to be solved when the number of elements grows by even modest degrees. Coupled with the fact that any ordinary (by human standards) sized object involves billions of sub-atomic particles that presents serious limitations.

Laughlin says that in his own specialty of solid state physics, it is necessary to look to empirical data to determine the additional laws that describe this aspect of physical reality. In general he suggests that science must turn to experiment to develop understanding in each major new area of study, and that additional complexity of structure almost always leads to additional aspects of behavior not predictable from an analysis of the component parts.

Laughlin argues that in a great many cases, the new hypotheses that are needed to explain observed phenomena seem to be tied to aspects of the structure of the more complex elements of reality (relates to Deacon's revival of Aristotle's notion of formal cause). There are, for example, aspects of the behavior of crystalline solids that stem from the way individual atoms are arranged into crystals and which reappear in crystals formed by different elements so long as the structural patterns repeat.

He further says that structure seems to be a major player in determining all physical law. He goes so far as to suggest that the regularities that we find at the level of QED may stem from deeper levels of structure that are not presently available to our observation.

Polkinghorne[14]:

Polkinghorne notes that chaos theory points up limitations in the predictability of physical behavior. The theory shows us that much behavior would be dependent on small variations in initial conditions, and that our ability to measure those initial conditions is inherently limited. He draws the conclusion that determinism itself may be limited here, not just our ability to predict. It is hard for science which purports to be based on experimental confirmation of hypotheses to insist that determinism holds in regions

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[13] Laughlin, Robert B; A Different Universe: Reinventing Physics From the Bottom Down; Basic Books, New York, 2005.

[14] Polkinghorne, John; Exploring Reality: The Intertwining of Science and Religion; Yale University Press, New Haven and London, 2005.

where the experiments cannot be performed.

Polkinghorne, like Laughlin, believes that the development of a more general scientific understanding of complex systems will require attention to both structure of systems and to the information content of such structure. In talking about this he writes:

> *Progress toward a general understanding may be expected to require a revolution in scientific thinking in the twenty-first century as least as great as that wrought by the discovery of quantum theory in the twentieth century. Two features may be expected to characterise this conceptual development when it arrives.*
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> *One is the recognition of the inadequacy of a merely reductionist account so that the addition of a complimentary holistic discourse will be needed, treating entities in the integrity of their wholeness. More is indeed different….*
>
> *The other conceptual development will surely be the placing of 'information' alongside 'energy' to form a joint basis for fundamental thinking. By information is meant something like the appropriate specification of dynamical patterns of orderly behavior.*[15]

Polkinghorne goes on to say that spelling out exactly what is meant by 'information' here will be one of the challenges of this development.[16]

Prigogine on Determinism[17]:

Ilya Prigogine has put forward the idea that the classical notions of physical science are approximations to more basic understanding. He argues that in complex systems that are not in thermodynamic equilibrium (most of the stuff we deal with in everyday life) the rules of strict determinism do not apply and that statistical rules must replace them. In this sense he argues that the type of understanding we have developed for quantum effects may be appropriate for all of physics, the classical deterministic laws being merely limiting cases of more general statistical laws.

Further Thoughts:

There are a considerable number of well established scientists who have come to the conclusion that the notion that physics as we have known it is complete, or that physics shows the world to be fully deterministic, are not correct. In the search for regularity science has tended to focus on those areas where complexity could be limited in order to make experimental design tractable. This has led to the discovery of a great many very important things about how our world works, but it has also led to an

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[15] *Ibid.* pages 30-31.

[16] See my discussion of information and value in "Evolution and Mortality"; Tarbell, David W, Collegium 2005.

[17] Prigogine, Ilya; The End of Certainty; The Free Press, 1996; and other works.

inappropriate emphasis on those areas where the world is most regular in its behavior.

In modern technology, engineers go to great lengths to eliminate sources of irregular behavior in the devices that they design (sometimes referred to as elimination of 'noise' or randomness). It is not easy to design devices whose behavior will be highly regular and predictable over a considerable life-span and range of environmental conditions. Many design ideas fail because they do not meet those criteria. Yet modern philosophy has tended to focus only on the regularity uncovered by science, and to dismiss the less regular aspects of the world's behavior.

From my own experience working in engineering and looking at a broad range of modern science I think the more appropriate philosophical conclusion might be as follows:

> We find strong evidence that the behavior of the physical world is highly constrained by the combined effects of present configuration, past behavior, and empirically determined physical laws.
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> Those constraints, in some controlled circumstances become strictly fixed (behavior is strictly predictable). {laboratory experiments, many astronomical observations}
>
> In a more general set of cases, those constraints limit, but to not strictly determine, the ongoing behavior of physical systems (behavior is predictable but only in a statistical and boundary sense) {weather, how our plants grow, our own health}

The second of these statements conforms to what we experience in a common sense look at the world. The present situation and past history of things strongly limits how the future will play out, but we can seldom make exact predictions.

Some have claimed that the peculiarities of QED lead to situations in which determinism fails and which may allow room for our notion of free will. The basic equations of QED are strictly deterministic in form. However, those equations do not lead to predictions of everyday events. What they generate is predictions of the probabilities of what will be found upon the occasion of measurement. We cannot predict what an electron will do exactly, but we can predict with exactness what the probabilities are, and the statistics generated from measurement agree with those predictions to very high accuracies.

There is, however, a great deal of question about how we should interpret what this sort of theory predicts (see Feynman[18], Wick[19], Rosenblum and Kuttner[20], and Polkinghorne above). I tend toward ideas like those of Polkinghorne, that phenomena

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[18] Feynman, Richard P; QED: The Strange Theory of Light and Matter; Princeton University Press, Princeton , NJ, 1985.

[19] Wick, David; The Infamous Boundary: Seven Decades of Heresy in Quantum Physics; Birkhauser, Boston, 1995.

[20]Rosenblum, Bruce and Kuttner, Fred; Quantum Enigma: Physics Encounters Consciousness; Oxford University Press, 2008.

such as quantum entanglement show us that in many circumstances reductive analysis that tries to treat all particles separately simply doesn't work, and that we are dealing with structural phenomena. I also believe that structure and significant information are closely tied[21].

Klemm and Klink:

In the June 2008 issue of Zygon, David E. Klemm and William H. Klink present a theory of consciousness based on an aspect of quantum theory. They note that QED allows predictions of probabilities and not of the results of individual events. They offer the hypothesis that in the individual event, the quantum element exercises the power of selection from alternatives influenced and constrained by what we then perceive as a pattern of probabilities. They link this hypothesis with Sartre's notion of basic non-reflective consciousness, which is determined by its relation to its object, and in particular by its valuation of its object.

Kauffman, Stuart[22]:

Kauffman accepts the causal closure and determinism of classical physics, and of the Schrödinger equation in QED. He argues that the transition from quantum to classical is *acausal*. He also argues that there are a number of emergent phenomena that cannot be reduced to physical explanation. I find a degree of tension between the idea that the emergence of certain features of biological reality cannot be explained through physics while accepting that the physical chain of action at the basic level is completely deterministic.

He presents the hypothesis that the human brain may be a system at a sustained critical balance between quantum and classical states. This allows him to assume that mental action can affect the classical body in the manner of quantum decoherence which, he says, is *acausal*. Thus he escapes the problem of how mental events can affect physical reality.

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[21] Tarbell, above, 2005.

[22] Kauffman, Stuart A; Reinventing the Sacred: A New View of Science, Reason, and Religion; Basic Books, New York, 2008.

Some Key Assumptions:

Human existence is a natural emergence from the world.

Thus Consciousness should not be expected to be something unique and/or unrelated to other aspects of nature. Consciousness is probable in a wide range of life forms, but not necessarily human like self-consciousness.

Self Conscious Experience is a valid form of Data about the world:

Like every form of data, it needs to be looked at with care. No data is self-explanatory.

The world of value shown to us by human experience is as much a part of the natural world as the world of force and motion studied by physics.

Consciousness is Generally Unified:

Our conscious experience seems to be singular. Multiple unconnected paths of conscious experience are liable to be _{sick}__.

Whatever natural explanation we would seek for consciousness would seem to be tied to the whole of our organism, not some limited part. The brain may be central, but as a systematic structure tied into the whole of our being.

Free Will is Real:

That does not mean that we are free in any godlike sense. We are embedded in this natural world and are clearly subject to causal influences. However, this natural world is not strictly deterministic. It involves an ever developing future drawn out of a realm of possibility. There are aspects of our behavior that are chosen from within that realm of future possibility. We do each make a difference in the way the world develops in time and so too do many other types of living creatures.

Science and Technology offer Important Information About this World:

However, it is the experimental and observational base of the sciences that is most reliable, along with whatever has been turned into repeatable technological achievements. Theory is unstable. Philosophic conclusions driven by theory alone are doubtful.

Structured systems play a more important role in the nature of things than standard physical theory has recognized (*eg.* Laughlin, Prigogine, Polkinghorne, and Deacon). In that respect, atomistic reductionism is wrong.

Speculations :

It strikes me that most of the speculation about the nature of our human selves starts from assumptions about what science tells us about the world. I think that the state of affairs is that physics tells us less than most philosophers seem to think. Physics has told us a lot about our world, but there has been a tendency to accept background assumptions of mathematical physics even in areas where we have no empirical basis for that acceptance. Further, our own first person experience is not taken seriously as a source of information about the world. While it is certainly true that our immediate experience can be misleading, it is not necessarily true that it is always misleading. If it is our judgment that humans are a natural product of evolution within this world, then our experience should be as good a source of data as any other and is clearly a form of data as much in need of explanation as any other.

The idea that free will must be an illusion is not founded in data but in theory. It stems from the assumption that present day physics is causally complete and that it shows us a strictly deterministic world. These two assumptions are both doubtful. There are broad areas of the physical world where we have no ability to predict events and there are a significant number of unresolved questions in modern physics.

If Laughlin and Polkinghorne are right in their assessment of the current state of the sciences then we should expect that a thorough understanding of life and conscious experience may require the introduction of new basic hypotheses, quite unlike those that have served us in explaining the physics of un-living matter.

Being-in-Time:

A basic fact of human experience is that it is an experience of being in time. Kant concluded that time was the fundamental dimension of experience, but he then seemed to draw his understanding of time from physical theory and not from experience. According to Kant, time was a matter of pure linear arrangement. That fit the notion of time embedded in Newton's physics but it doesn't match my everyday experience. In Newtonian time, there is no basic difference between past and future, and the direction of change seems to be an accident. That kind of an abstraction from experienced time has served mathematical physics well (for the most part) but abstractions tend to be limited in relation to actuality.

Our way of existing might be called 'Being', to focus on the event-like character of experience. The word 'event' could be misleading here as it implies a singular thing whereas human-being is continuously ongoing, as is the world.

A key element of our everyday experience is that it is always 'now'. Our experience is an ongoing event that is happening right now. That form of expression, could, however, lead to a misunderstanding. The experience of 'now' does not correspond to the notion of an instant of time without dimension. The 'now' of current experience is always a 'thick' now, and how thick is highly variable. And, experience is of constant change. Nothing stands totally still.

Our everyday experience is always built upon an already established past. We are already in some situation and usually we are already involved in some form of action. Whatever may happen next, and whatever we may choose to do, these things are founded on and constrained by the already established past.

Our everyday experience is always one of choice. That choice may be constrained sharply or less so, but there is always some degree of choice coupled with constraint as to how we continue from where we are. And we always await the unfolding of a future which we can only partially predict. However, it is also important to recognize that we can always at least partially predict that future. It too is constrained by the already established past.

It is curious that little in our scientific notion of time reflects any of this (with the exception of the notion of response time and the corresponding notion of bandwidth found in engineering applications of technology). I suspect that this picture of the character of time and being drawn from phenomenological reflection is also a good representation of the character of time in the world more generally. The notion of time found in theoretical physics is a good abstraction for some purposes, but does not seem like a solid expression of the real.

Being-in-the-World:

A second and related basic aspect of experience is that it is always the experience of being in a world, where by world I mean a structured pattern of self and environment.

Our theories of physiology would seem to tell us that our contact with our bodies and with the external world is mediated by a discrete set of sensory data, but our experience is always of an organized world. As Searle says, our experience is always more structured than our sense data would appear to be. We can only arrive at the theory of discrete sense data by abstraction from the actual content of experience.

This world we find ourselves within is not just structured in the sense of physical organization. It is much more complex than that, and value and significance are key aspects of every occasion of experience.

Our connection with the world is curious in some ways. The simple thought would be that we are physical organisms living in a particular place and time, and we interact with our environment at our physical boundaries. Yet experience isn’t quite that simple.

When I am driving my car along one of the local roads my sense of interaction is more of the car than it is of my organism. I decide to turn right and take that right fork in the road, I am not aware of deciding to turn the wheel to the right. When I pick up the phone and talk to my friend, my sense of interaction is with that other person. The means of achieving that become transparent. Yet when I go out for a walk and twist my ankle, I become aware of the motion of my foot relative to my lower leg, and I seem to be interacting with the world at boundaries that are inside my body. What is key and

constant in conscious experience is that the world is organized, structured, significant, and found from a particular perspective. Structure in multiple senses, and perspective are the constant attributes of my experience. I am in a world, and am located (in a broader sense than geometric and physical) within that world.

Structure-in-the-World:

As Searle and others have pointed out, our experience of the world is more structured than our sense data. There is very good reason to believe that our human organism adds an interpretive element of structure to the raw data of experience. The fact that our experience sometimes turns out to be in error, with various forms of misperception and hallucination, further supports the idea that we live in an interpreted world.

On the other hand, the success of our processes of interpretation, most strongly the success of modern science and technology supports the belief that the world that stands behind our raw sense data is in itself structured in a way that makes it amenable to our acts of interpretation. There is far too much corroboration of our interpretive images of the world for us to believe that our experience is all made up in that sense. The details of our theories are always open to change, but there is a vast body of experiential data that supports the generality of our interpretive procedure. We have discovered that Newtonian physics is only an approximation to the reality of things, but we can and do build a great many devices that would not work if that theory were not a good approximation. The same is true of our more modern theories such as QED. The theory is not certain, but the quality of the approximations to reality that it allows is unquestionable.

There are a number of ways in which structure shows itself to be a factor in the nature of things. In basic particle physics, our sciences have found matter to be made up of a variety of sub-atomic particles. Atoms are described in terms of nuclei made up of protons and neutrons surrounded by shells of electrons. When we look at the behavior of electrons in an atomic shell it turns out that they are not like independent particles orbiting a nucleus (like planets around a star) but that they form a structured system with very specific rules of structure and behavior. Thus it would be accurate to say that an electron within an atomic structure is not exactly like a free electron. The structure itself is a real element with causal consequences in the world. I think the same sort of thing may be said about molecules within a living cell, and about cells within a living organism.

Laughlin’s work suggests that structure is a major element at all levels of physical reality. It is a mistake to believe that the character of the world can be determined from the separate character of individual primary particles. Structure plays a role which could not be derived from the character of its parts at every level. Deacon’s work is significant here also. He has shown how considerations of structure or form may be causal in a wide variety of situations.

Thus we can say with certainty that the reality of the world we live in is characterized by a high degree of structure some of which is of the sort that can be

approximated to very high degrees by means of mathematics. Some have drawn the conclusion that fundamental reality must itself be a mathematical structure, but that is at best an hypothesis which could never be completely verified. Gödel's theorem showing us that mathematical systems can never be both consistent and complete raises questions about what it would mean to think that our reality is a mathematical system. Mathematics seems to be far too much a human creation to give it that sort of ontological status. Further, it seems wanting in the face of many elements of experience. It is at best an abstraction.

Our experience appears structured in ways that involve many elements over and above the merely mathematical. There is good reason to believe that our interpretation of the world in these other dimensions is also a good approximation to reality. Further, life itself appears to be a matter of structure, and Chalmers hypothesis that 'information' (*i.e.* structure) is the basis behind consciousness has at least some claim to acceptance apart from his other assumptions about the physical world.

Being of the World:

The world appears to be an array of continuous process in which definiteness is determined from possibility. Time is a measure of the change of such process.

While there may be a larger picture which we have yet to grasp, the world as we encounter it seems to flow from a situation of maximum order (the original big bang) towards a pattern of minimal order (the extreme expansion of the universe). At either extreme there is little or no complexity. The pattern of change from the one extreme to the other exhibits a high degree of energy. In the interval between these two extremes, varying degrees of complex structure are possible. There is a tendency to form complex order where the flow of energy permits.

The physical structure of the world has been partially revealed by our modern sciences. We are able to predict and control significant aspects of how our world behaves. At the same time there seem to be broad aspects of that world that we do not understand well at all. Modern quantum electro-dynamics (QED) makes highly accurate predictions of many physical processes, and yet there are fundamental enigmas in the very heart of that science. We really do not understand what it means, but it does seem to tell us that there are aspects of this world (entanglement based action at a distance for one) that seem quite mysterious.

It seems clear from physical theory that the atomic structures within which we find elementary particles themselves have a causal role to play in the behavior of these particles. The phenomena of entanglement, where one apparently independent particle affects another across significant spatial separation suggests that there are times when these supposedly independent particles need to be seen as parts of a single structure that involves spatial extension. The claim that all phenomena can be explained by analysis into smaller and smaller parts fails at a number of levels. Structure plays a role and influences the behavior of its parts. Similarly things cannot be analyzed into smaller and smaller local areas. There are many phenomena within the physical sciences that cannot even be described without reference to regions extended in both time and space (all wave

like phenomena). Reductive atomism fails in a great many ways.

The total failure of physical science to explain conscious experience needs to be seen in relation with the strong pattern of success in developing a general understanding of the evolution of living things, up to and including ourselves. The fact that we are conscious, that we are related in a continuum with other creatures in this natural world, and that physical science does not account for that consciousness, suggests that there is much more for us to learn about this natural world.

Emerging Life and Consciousness:

Various aspects of reality emerge as growing complexity of structure.

Life emerges as material which in itself involves the continuous emergence of structure. The metabolic process within living things provides a source of energy for such emergence of structure.

There are conscious mental processes going on in we humans, and we tend to believe similar processes going on in at least some other animals. There has been a lot of speculation to the effect that the kind of logical or computational processes that we can get computers to follow may show us how thinking takes place in our brains. One difficulty with that idea is that most of our thinking seems to be somewhat different from such computational patterns.

Roger Penrose has pointed out that Gödel's theorem raises some serious difficulties here. Gödel showed that in any system of symbolic logic as complex as the two-valued calculus used by Russell and Whitehead in their "Principia Mathematica" there must be some true propositions that cannot be proven to be true. That is there are some true propositions that will never be the outcomes of computational algorithms. Yet we humans can intuit some such propositions. This would indicate that we arrive at these ideas by a method that is not well represented by computational algorithms.

It seems clear to me that much of my own thinking proceeds by methods that are not strictly computational. The methods of exact logical deduction can sometimes be brought into play later, but they are not the initial or primary ways of thought. I am highly skeptical of the idea that so called 'Artificial Intelligence', which generally means modeling of thought processes through methods of digital computation, is a good replica of human thought

There is good reason to think that our thinking proceeds through the generation of structured hypotheses which are then tested through experience. This type of thinking will not generally lead to certainty, but rather to plausible conjecture. At base, this method of thinking is similar to the idea of evolution by natural selection. Even in the deductive sciences (logic and mathematics) our thinking often proceeds in this manner. First comes the intuitive guess, then comes the development of a deductive proof.

Life as Structure:

All living things are examples of complex structure and of systems that are far from thermal equilibrium. Aristotle observed that metabolism was a key aspect of any living thing, and metabolism is a process of thermal energy exchange far from equilibrium.

There is evidence to suggest that at various levels, complex systems have a causal influence on their component parts. This is not cause in the form of an external force, but rather in the form of constraint. Systems seem to generate constraints on how their parts behave.

Human consciousness appears to be an emergent reality based on an underlying organic structure. Our conscious experience would appear to be tied to the processes involved in creating and interpretive structural image of our world, and in projecting such images into possible future developments. The evidence of our experience indicates that such structural factors have a causal influence on the way that our bodies move. I think first, and then I speak. And those first thoughts are not usually in linguistic form. Spoken language is not the first language of thought. We frequently struggle to bring our ideas into clear linguistic form.

Our own attempts to bring coherence into our sense of the world, and into our way of living are continuous with the role of structure in this natural world.