A Dialogue on Causality, Relations and Other Things

Edwina Taborsky and Ron Cottam

The following is the extended text of an online dialogue between Ron Cottam and Edwina Taborsky. The discussion addresses the grounding of the themes of the papers by Ron Cottam, Willy Ranson and Roger Vounckx, which appear in this issue, and the paper by Edwina Taborsky, which appeared in SEED, Vol.2/2.

Edwina has suggested that, after the Big Bang, the resultant loss of symmetry required other methods to establish a new type of symmetry. This new type of symmetry enforcement can be understood as 'interpretive'; that is, it operates as a network of codification by measurement, a measuring process that interprets relations, treading a fine line between the asymmetry of discrete differentiated matter and the symmetry-inducing forces of evolving group habits. Ron also agrees with this symmetry-breaking concept, and introduces the notion of 'struccess', closely related to consciousness, which is rather similar to Edwina's notion of the mediating process of the sign.

Edwina's paper 'The Six Semiosic Predicates' outlines a thought-experiment of an original Unity of energy that broke apart with the Big Bang, which introduced gradient differentiations of energy. To prevent ultimate dissipation of energy into randomness, the universe developed a symmetry-inducing process of a network of relations, which synthesizes and develops common codes of reality within which instantiations of those common codes can develop. The whole process – the common code, the instantiation and the interactions – is called a Sign, understood as a dynamic triadic action of relating three 'nodes' with three relations.

One of Ron's papers concentrates on structure, the other on dynamics. In the first paper he introduces the notion of scalar levels or multi-level hierarchies of reality. He too uses the concept of a system as operating within or being a network, described using the representational device of 'balls and sticks' or, in my terminology, instances and relations. But, we very rapidly moved into disputed issues.

Edwina:

You seem to be operating within a Platonic notion of an ideal form, when you state that the system, which is to say, the reality or sign-unit "*can only exist as a partial negation of, or ambiguity in, its own state*". The theme of Platonism, understood as an ultimate or non-existent reality or model, seems to be a central part of your thesis, while I reject such a framework. This difference is important. To you, the Sign or wave-packet is

a compromise between a model particle, as an ultimate, non-existent localization, and a model wave, as an ultimate, non-existent delocalization. However, there *is* no ultimate ideal model; instead, there are normative habits that evolve along with the singular instances; these normative habits operate as the modeling constraints on any singular instance. Normative habits are defined as measurements operating in global space and progressive time.

Ron:

I do not myself see such a simple resolution. I have a few problems with your statements that "*The theme of Platonism, understood as an ultimate or non-existent reality or model, seems to be a central part of your thesis, while I reject such a framework*" and "*there is no ultimate ideal model; instead, there are normative habits that evolve along with the singular instances*".

In the SEE conference in Toronto 2001 I proposed a view of active living which made use of two different logics (Logic 1 and Logic 2). This pair represents the two complementary parts of engineering, namely a Rosen-like 'building a formal model to represent a multiplicity of observed real phenomena' (Logic 1) and a somewhat creative 'building a physical structure which will (hopefully) operate in the real world like the formal model' (Logic 2). If we separate these two Logics, and pretend that each of them could be individually sufficient (thus being also unfortunately forced to presuppose that the two senses of from-real-towards-model and from-model-towards-real are a reversible pair) we obtain analogues to Aristotelian (Logic 1) and Platonic (Logic 2) viewpoints. By rejecting the Platonic analogue we rupture the completeness of scientific investigation, which also makes use of Logic 1 (to form its models) and Logic 2 (to design its experiments).

Edwina:

I see your point about the two methods of dealing with reality. Logic 1 is attempting to model 'hard data'; Logic 2 is attempting to build an instance that operates according to laws or rules. I wonder if we should really call this second process a logic? Isn't it instead an 'actualization of a logic'? I understand a logical format as a syntactic structure, a rational abstraction, that is not existent as a 'thing-in-itself'. Isn't a model, not an objectification of discrete actualities, but a general code that itself can't be actualized

because it is so general? So, I have a problem with, using your example, Logic 1 being Aristotelian and Logic 2 being Platonic.

On another point, I do agree that it might be very important to consider that our world operates with TWO formal models. If we accept that there might be two different types of modeling, I wonder if this would compare with my internal and external codes of Thirdness? That is, I am also saying that there are two modeling processes: there is the internal model of Thirdness-as-Secondness and the external model of Thirdness-as-Firstness. But, these are not comparable to your Logic 1 (Aristotelian) and Logic 2 (Platonic). My internal model operates somewhat like a Bayesian statistical mode, focused on multiple probabilities, while the external model operates like a regular frequency statistic of 'normative averages'.

Ron:

Logic 2, as I describe it, is the static formalization of a means to an end, not the "*thing-in-itself*" which is its consequence – this appears to correspond well to your description of a logical format as "*a syntactic structure, a rational abstraction...*", but here the structural parts are not purely abstract (whether or not this would in any case be possible), but they are derived from the application of Logic 1 to what you refer to as "*hard data*". I find it difficult to see why a model must of necessity be "*a general code that itself can't be actualized because it is so general*". The relationship of a model to its actualization would seem more to be closely related to the degree of correlation between its local and global applicabilities. Some models are closer to their actualizations than others. However, I think it is important to note that I am not suggesting a requirement for two formal models – merely suggesting that in modeling and constructing we are not necessarily using the same set of rules.

Plato and Aristotle expressed individually reduced, and therefore opposite, parts of the indivisible complementarity of our relationship with our surroundings. Their sequential propositions resemble the initial swing of a pendulum from one unstable side to the other, prior to progressive loss of prejudice and stabilization as a compromise.

The statement that "*there is no ultimate ideal model*" is itself a Platonic viewpoint, as is any 'creation' of a 'this is real' reduced (and therefore always partially 'wrong') model.

Edwina:

There are, as you know, different types of statistics and different models. I am positing that the external model (Thirdness-as-Firstness) fits in with what we normally refer to as 'frequency statistics' in the sense that it is a statistical average of its experienced data, i.e., it develops a constraint focused around the average measurements of its 'instances'. The internal model (Thirdness-as-Secondness) is possibly Bayesian, considering all possible models, and as such, is linked with its instances.

I note what you say about 'complementarity'. Is this the complementarity between a wave and a particle, or is it between the Internal Realm and the External Realm, each with their own logics? Is your Logic 1 similar to my External, and your Logic 2, similar to my Internal? I don't think they are similar, but, the concept that there are TWO modeling processes is extremely important.

Ron:

"*The resultant loss of symmetry*" due to the Big Bang, to which you refer in your paper, and the required "*other methods to establish a new type of symmetry*" seem together to be fairly close to the initial complementarity which evolves to evolution. The idea of "*TWO modeling processes*" is itself a reduced model of a complementarity, as is our own proposition of two separate logics, and I think we must be very circumspect in presuming that there are 'really' two separate processes involved and not one (or some other number). Reduced models are only useful if we remember that they are not necessarily 'true'.

Complementarity is indivisible, except by imposing death or extinction. Existence itself, as we picture it, is derivative. It is just that, a picture. We should not preclude the possibility that it is a reduced model of a higher level complementarity which is screened from us by the reduced nature of our analytic formality (and of which I am here, naturally enough, presenting a Platonic image – but as a non-excluded feasibility, not a fact!). Otherwise I have a little difficulty in squaring a world in which "*a non-existent model does not exist*" (my paraphrase), which appears either to say nothing, or to presuppose that there are at least two formulations of existence.

Edwina:

Let's take a look at what you are setting up. You've got two logics. The first logic is a representational model of the 'real' world as it is experienced by the organism. The second logic is a physical representation of that model. You say that the first is Aristotelian and the second is Platonic. Now, are we forced to choose either one or the other? Couldn't our world be made up of both processes?

Ron:

That indeed seems to be the implication of my suggestion that "*This pair represents the two complementary parts of engineering*".

Edwina:

I'm going to insist on two models. I'm suggesting that our world operates using both internal and external modeling processes. We sound, by the names we have given to our models, far apart. You use the terms 'Aristotelian' and 'Platonic'. I use 'internal' and 'external'. At the moment, I think we should ignore terminology and focus, at first, on the fact the we both posit the necessity for two models.

By the statement that "*there is no ultimate ideal model*", we understand that there is no final model, no pure organized state. After all, anything that is existent is also spatiotemporally existent. Anything that exists does so as an organization of energy in both space and time. As such, it is never complete, because space and time reduce its reality to a contextual mode of existence according to 'that time' and 'that space'. An ultimate model would 'exist' beyond the perimeters of contextuality. Can it?

Ron:

'Ultimate models' can indeed 'exist' beyond the perimeters of contextuality – in our imagination – and consequently they can be wrong! But that does not stop them existing. I find it difficult to reject the 'existence' of ideas whose manipulation forms the basic creative route towards the construction of more physically 'existing' objects.

I agree that the terminology itself is not of prime importance, but may I again point out that in what I describe above I am not referring to two different *models* but to two different statically formalized processes, each of which targets the construction of a

different entity, one abstract (a model), the other in simplistic terms 'real' (a thing). I wish to clearly distinguish between the static formal representation of an *observable* and the static formal representation of an *observation*. At the very least, these two appear at different levels of any observational structure, and I would maintain that, more realistically, they appear as non-interchangeable complementary elements. I do not think that the difference in point of view here is principally one of terminology.

Edwina:

I agree. An internal model, an imaginative model, can indeed exist and plays a vital role in manipulating future states.

Now- let me define 'complementarity' with more specificity and clarity. The simple hypothesis is that it posits a reality operating in two forms, both as a wave and a particle. This is, I think, an inadequate image. I'd rather say that reality, in its existentiality, operates within different modes of space and time and therefore operates as BOTH a wave and a particle. I understand the wave dynamics to operate internally and the particle dynamics to operate externally. So, reality is both an internal and an external mode of organization. Let me draw a diagramme, based on the Cartesian coordinates of X and Y.

Figure 1

Think of this whole diagram as the organizational reality of an organism and its surroundings. The Y axis functions as the ontological 'cut', separating reality into an internal and external mode. The X axis functions as the epistemological 'cut', separating reality into a local contextualized mode and a non-local global continuous mode. Simply

put, there's a 'top' and a 'bottom': the top is local internal and external space; the bottom is global or non-local space.

Let's consider an example. Think of the local internal mode as the wave aspect of reality. It's the mode that is so internal that it is experienced without observation. On the right side, is the local external mode of existence. It's observed and you can only observe it as a whole; you can't see inside, so to speak. It's the particle mode of existence - that solid rock over there. Both sides use a non-local model. Internally, the model is a set of multiple probabilities. Externally, the model is a frequency statistic of 'what normally happens in this area'. In the case of the rock, the external modeling perimeters would be the effects of the local environment - sun and water erosion for example – that result in the 'normal' rock formation in that area. The internal model would be the chemical composition of the materials of that rock – which are then moulded by the external model.

Ron:

Your initial comments on complementarity correspond to Nils Bohr's own presumption, which was precisely that reality "*operates as BOTH a wave and a particle*", and that we observe whichever we look for. Measurements made during the last two decades indicate that it is possible to set up experiments which measure simultaneously partial wave and particulate characters (see, for example, Mittenstaedt et al., *Foundations of Physics* 17, 891, 1987).

The categoric specification of a uniquely holistic 'external' viewpoint (of, for example, a rock, the inside of which we cannot see) does not seem to take account of the differing penetrations provided by the different viewing techniques science now makes available. I have spent sufficient time taking X-ray photographs of crystals and recording commercial music to feel that any 'external' viewpoint is very much context- and observer- dependent.

Edwina:

Who cares? Why should the external be, itself, knowledgeable about the internal? My point is that both modes of organization necessarily exist. Notice that I am not focusing on the role of the observer but the mode of organization, regardless of observation.

Ron:

This seems to be a rather thorny issue. If 'true' primary experience is internal, but this experience is completely cut off from 'the external', I find it difficult to see how the external could have any means of establishing an even cursory validity or usefulness. Without the intervention of processes resembling observation, modeling and creativity the internal and external would appear to be mutually irrelevant.

In this context, if I may, I should like to concentrate a little further on the Platonic/Aristotelian viewpoint-distinction you make, and the link I established above between their combination and "*a view of active living … (which) represents the two complementary parts of engineering*".

Plato, as I understand it, and as you imply, is presenting a 'world view' within which the human intellect contains *perfect* models which correspond to *imperfectly* sensed realities. However, he suggests that these models reflect realities which are *themselves* perfect. There are now not two but *three* parts to the assembly: *two* identical perfections ([P1] a 'Godlike reality' itself, and [P2] its reproduction in the human intellect) and [P3] the imperfect sensation of reality. The only one of these which is (presumably) subject to spatiotemporal change (i.e. dynamics) is [P3] the imperfect sensation of [P1] the perfect reality. So far, so good – this corresponds functionally to your own description.

Aristotle, on the other hand, and again as I understand it, is presenting a *two* part 'world view', within which the human intellect contains [A1] imperfectly-constructed models of [A2] sensory information. As you note above, *both* of these, [A1] and [A2], are subject to spatiotemporal change, as the intellectual models are *derived* from sensory input, and therefore both are subject to the 'flow' of experience.

Edwina:

Just a word of caution- let's drop the 'human intellect' concept from our discussion. I think our models operate beyond the human realm – at least, my models are not based on human cognition. I do see your point about the three parts to the Platonic assembly. But, I have a few problems with this setup. First, is the notion of a perfection of Form, which denies the possibility of any evolution of these models. And second, the reproduction of that model in the human intellect is presumably subject to change. That is, if you were living in a state of 'doxa' as opposed to a 'noetic' state, you would have a very imperfect

intellectual model. But importantly, your P1, P2 and P3 are quite different from my model. I don't have a Pure Ideal Model. Then, still thinking about a model rather than a discrete instance, I have TWO modeling processes. There is an external model, which is the statistical average of the number of instances. This would be something like the statistical average of existent yellow finches in an existent population of birds in a geographic area. And, I have an internal model, which is the potentiality to produce a functional bird species in that geographic area. Now – can these two models be compared with your two models? Would the internal model compare to the Aristotelian, as Logic 1, and the external to the Platonic, as Logic 2? Or, is this 'stretching the point'?

Ron:

I find it difficult to eliminate human intellect from the argument – after all, it is precisely within the confines of human intellect that we are constructing this discussion. We are inventing simple models of a reality which may be far more complex, and of which our models may be only very approximate representations.

I feel that Plato might object rather strongly to your suggestion that the reproduction of perfection of Form in the human intellect would be subject to change…

The formulation I gave above exposes a clear differentiation between Plato's and Aristotle's positions, as you hinted earlier. In Plato's world, representation and reality are *compared*: in Aristotle's, representation is *derived* from reality. However, both of these descriptions are static in nature, whilst scientific investigation is primarily *dynamic*.

Edwina:

A problem with reconciling our two outlines, is that you are working from the 'perspective' of an analytic agent. I am working without such an agent.

I agree with you, in a cursory way, that Plato compares representation and reality, while in Aristotle, representation is derived from reality. However, these are two processes of entangling a model and its articulation within an actualization. Isn't it possible that reality uses both processes? Could the comparison tactic be the external process where a statistical average develops to constrain emerging actualities within that model? Could the derivational tactic be the internal process where multiple probabilities are available to guide an emergent actuality?

Also, I don't think that it is merely scientific investigation that is dynamic. Natural processes, whether physical or biological, are dynamic. So, a static model won't capture this dynamism.

Ron:

Quite. This is precisely the problem with any description which uses static representations of processes – and, as Koichiro Matsuno would point out, this is all we have available. All static descriptions are of necessity partially 'wrong' in that they never capture the complete characteristics of their subject. All we can hope to do is to negotiate between description and subject to find a form where the distribution of their correspondences matches our requirements as well as we can manage.

The normal course of events in a scientific investigation includes *both* Platonic and Aristotelian phases: neither of them is either sufficient or effective! A scientific journey usually begins with the conclusion (!) that observed *real* phenomena are inadequately represented by a previously derived model (originally set up through Logic 1: 'for building a formal model'), and that the model needs to be changed (an Aristotelian conclusion). This is followed, sooner or later, by the proposition (following Logic 1) of a new model, nominally perfect in itself, which could do a better job. Experimentation (designed through the use of Logic 2: 'for building a physical structure') is then required to test the relationship between the model and phenomenological measurements. However, this is *not* what usually occurs: usually experimentation is carried out *to attempt to demonstrate* that the new model 'fits' better than the old one did (a particularly Platonic approach).

The consequent imposition of an observational bias often seriously degrades experimental integrity and leads to the corruption of data and erroneous model validation (an endeavor which is often supported by reference to 'experimental error' - an entirely Platonic phrase!). An excellent example of this problem can be found in the publication in Nature 333, 816, 1988 by Jacques Benveniste and his co-workers of observations "*that highly dilute* (i.e. in the absence of any physical molecule) *biological agents triggered relevant biological systems*" (commonly referred to as the 'memory of water') - observations whose validity was subsequently rejected after the participation of a group of external researchers in his laboratory's experiments. Medical science insists on the use of 'double-blind' studies specifically to avoid the inclusion of this kind of systematic bias in the evaluation of new drugs, and to distinguish between chemical and placebo effects. All this is because people are – people.

Ultimately, it will have to be accepted that the new model (which was derived through use of Logic 1) is *still* insufficient to perfectly represent phenomenological

reality (another Aristotelian conclusion, with Platonic overtones!), provoking yet another cycle through the entire sequence, and finally generating a 'history' of Platonic-Aristotelian 'oscillation' towards the hoped-for coalescence of reality, model and sensory data within a unified viewpoint.

But why do we bother at all?

Plato provides the incentive for us to push through difficulties towards an 'ultimate model' of natural phenomena ('Grand Unification Theory', for example?), spurred onward by the hope of being accepted as 'one of the Gods' (a Nobel Prize, perchance…?); Aristotle is responsible for bringing us down to earth again, by his insistence that an acceptable model must correspond to empirical investigation.

OK. All this is looking at what you have suggested we are setting up in terms of two thousand year old arguments. But a lot of water has passed under the bridge since then. I do not easily accept that Plato and/or Aristotle have said *everything* that can be said about 'the framework of the model and its instantiation'. Purely Platonic and Aristotelian viewpoints are only segregated partial models of a more inclusive complementary description of our relationship with our surroundings, where, as is usually the case, the reductive description of an inherently complementary unification produces oppositely polarized *static* structures, whose individual natures are insufficient to depict the overall dynamics. The question of 'existence or not' of 'an ultimate model' depends on 'acceptance or not' of this complementarity between Platonic and Aristotelian viewpoints. A binary answer to any question of 'existence *or* not' is most certainly *not* a complete story.

Edwina:

I accept your point about the 'purely Platonic and Aristotelian viewpoints are only segregated partial models'. But I am talking about two different modes of *organization* of energy/matter, not simply two different modes of *analyzing* energy/matter. Now- what about redefining these viewpoints as, in order, Logic 1 and Logic 2, or Internal and External, and positing that not merely our scientific investigations but reality, requires both processes?

Ron:

I am not convinced that the Logics 1 and 2 that I describe are equivalent to Internal and External. They are merely a primitive attempt to burrow into how we do things, noticing that modeling and constructing processes apparently work in different ways.

Edwina:

I agree. We can't use these analogies.

Ron:

I have a problem with your apparently complete separation of 'organization' from 'analyzing'. I would tend to think that organization (in some form) requires analysis (in some form), which would suggest that analysis is part of the means by which organization is created. While I agree with your earlier comment that "*A problem with reconciling our two outlines, is that you are working from the 'perspective' of an analytic agent*", I am more skeptical about your "*I am working without such an agent.*" For example, I do not see that it is possible to describe the concept of Internal without differentiating it from External, which requires an agent. Quantum mechanics approaches this dilemma by specifically pointing out that measurement imposes change. The agent relevant to describing Internal is the describer him-or-herself – whose sensory capabilities define the way Internal is described. We cannot easily divorce ourselves from our ideas just by saying 'let it be so'. Or, is this debate taking place within a uniquely Platonic domain?

Edwina:

No. The separation of matter into an internal and external doesn't require an agent, in the sense of an observer. It only requires a temperature differentiation, which 'congeals' matter into a 'form', such that this congealed matter is differentiated from that which it is not. There's no agent observing this.

Ron:

I am inclined to wonder who or what knows that this is the result of a temperature differentiation?

We should not forget the nature of the relationship between the two *people*, Plato and Aristotle. Some time after Socrates' death Plato set up his Academy, and later on Aristotle became one of his students. The contemporary mentor-student affiliation exhibited many of the characteristics of a parent-child relationship, within which progressive development of independence leads ultimately to rebellion as a declaration of equality. Aristotle finally rejected Plato's enthronement of the perfection of ideas in favor of a more humble relationship with his surroundings.

Edwina:

No, no, don't bring a psychological parent-child dyad into this analysis! It's quite possible that Aristotle's views were based on reason, logic and evidence, and not on any psychological need to 'be different'.

Ron:

Indeed, quite possibly, but even so it is an interesting thought!

If I may, I should like to present at this point a rather Pirsig-like view of Motorcycles. Not, in this instance, one of Maintaining them, nor just of riding them, but of falling off them! Some years ago I noticed a posting on Usenet from a father whose son had just bought a motorcycle. He was hoping that someone could tell him how to stop his 18 year old son killing himself. Amongst the many replies was one very long description of 'measures of avoidance', which concluded, however, with the following comment: "… *but unfortunately there is nothing you can really do, because an 18 year old boy believes he is immortal*".

An 18 year old boy is perfectly capable of understanding and expressing the inevitability of his own eventual demise, but equally capable of acting in a multitude of ways which directly contradict his acceptance of this concept. Jacques Benveniste subsequently won a libel action against the French science magazine 'Science et Vie', who had claimed that his observation of the 'memory of water' was a fraud. It seems clear that his laboratory's observations were in fact honestly carried out, but that they were unfortunately biased. What we do, and what we *believe* we do, are rarely the same. Conscious rationality is modulated by the unconscious, and vice versa, and what we *are* is defined by this complementary interaction. Plato appears to have merged [P1] the 'Godlike reality' and [P2] its reproduction in the human intellect, and by doing so created an *immortal soul* and made *man* one of the Gods. Is this what Aristotle was rebelling against by placing himself *within* nature and not *above* it?

Edwina:

It's possible. But - we are getting off track into idle psychological speculation.

Ron:

Speculation – yes. Idle – no. Motive and belief play a large part in the formulation of the apparently incontrovertible arguments which we use to construct ideas and subsequently to defend them.

I must take issue with the "*specificity and clarity*" of the definition of complementarity you presented earlier, which I find self-contradictory. If I may refer to your statement that "*An ultimate model would 'exist' beyond the perimeters of contextuality*", the 'two forms' within which you suggest reality operates are *themselves* beyond reality, or contextuality! A pure (and therefore perfectly monochromatic) wave would not be subject to Einsteinian relativity. Any change in its phase at a given location would be *immediately* transmitted to *every other location which the wave touches*!

Edwina:

Agreed. That's due to the internal modeling process, that global or non-local process of storing all probabilities.

Ron:

The mathematics of physics presupposes that we can describe spectral phenomena by reference to combinations of perfect single (monochromatic) wave equations. A 'wave' is an 'ultimate model' (to use your terminology) which is *entirely* outside our sensory domain: its only measurable manifestation is *im*-perfectly monochromatic and *at least* limited in its velocity to the speed of light (and usually even more so. It should be noted that measurements of quantum mechanical electronic tunneling between solid state media can apparently imply velocities which exceed the speed of light, but careful investigation indicates that this is a question of what part or frequency of the multi-chromatic electron wave packet we are referring to, and it does not constitute a contradiction to Einstein's propositions). The 'waves' which we measure are imperfectly monochromatic, whatever we do (and at the smallest scale, their 'imperfection' is specified using Heisenberg's Uncertainty Principle). Similarly, a 'particle' is a dimensionless mathematical singular representation of a very small but *not dimensionless* 'object', and it too is beyond contextuality (and subject to Heisenberg's arguments). Yes – while the requirement for confirmatory measurements is based on Aristotelian ideas, scientific models relate to empirical measurements in a *Platonic* manner!

I conclude most happily from your statement "*that reality operates … as BOTH a wave and a particle*" that you are setting up your 'singular instances' by reference to a complementary pair of ex-realistic 'ultimate' models, as we do ourselves. I do not, however, accept that this is Platonic – if anything it is Aristotelian! It is not only very pragmatic, it is most decidedly central to the tradition of scientific discourse, where a 'model' is temporally fragile, and is only made use of until a more effective one shows up.

Edwina:

Why does it have to be an either-or model? Why can't reality require and use two different modeling processes?

Ron:

The possibility that reality requires and uses two different modeling processes is itself a model – which may supercede one point of view, and be superceded itself by yet another.

The emergence of sapient beings in an otherwise inanimate (or inplantate?) nature bears witness to yet another pair of complementary logics, namely an evolutionarily-early logic-which-must-conform-to-'physics' (which scientific logic attempts to emulate) and its later counterpart logic-which-can-escape-physical-limitation (abstract logic - which is all that science can currently achieve).

The very existence of a Platonic-versus-Aristotelian 'surely *one* of them must be wrong?'-conflict bears witness to this distinction. Conflict is grounded within abstract logic as a confrontation between differently-simplified segregations of a natural complement. Nature precludes the confluence of conflictual phenomena: abstract logic alone does not.

Edwina:

I agree with this concept of an early mode of modeling, and a later mode of modeling. But, these two types are not the same as the internal and external model, or the Aristotelian and Platonic model. I suggest that these early and later modes of modeling can be more fruitfully examined within the Peircean relational categories of an iconic model, an indexical model and even later, a symbolic model. This is beyond the scope of

our discussion here, but I am bringing it up to caution against a too-ready merger of models.

Ron:

I am not aware that there is any sense of merging models involved in a process of relating them to each other.

There is nothing in nature, however, which precludes the 'existence' of, or belief in, models which science can easily disprove. Although the concept 'that heat consists of a hypothetically indestructible, uncreatable, highly elastic, self-repellent, all-pervading fluid' (*caloric*) has been comprehensively disproved since some hundreds of years, most people *still* think of heat in a *caloric* manner as 'something you put into things to make them hot' (it is interesting to note the similarities both in definition and use between the concepts of *caloric* and *energy*!). The perpetuation of distinguishable entities within nature brings with it the requirement that they be partially (en)closed. This even makes the simplification of complex 'realities' *necessary* for survival! If we cannot accept that unproven beliefs 'can exist', how can we maintain that we can distinguish between different and therefore (at least) partially isolated entities?

Edwina:

Well, something that is differentiated IS feasibly differentiated from something else. That requires closure, even if it's a fuzzy border. But, this has nothing to do with simplifying complexity as 'necessary for survival'! And I don't see the logical relation between accepting that an unproven belief exists and differentiation between 'partially isolated entities'.

Ron:

The idea of 'differentiating something from something else' is itself a simplification, as you indicate through "*even if it's a fuzzy border*". I don't recommend addressing the complexity of an approaching multi-molecular motor-car as a prelude to jumping out of its path – I think our limited information-processing capabilities would be consequently over-burdened – or extinguished!

The question is more precisely one of the feasible *lifetimes* of different styles of entity, and of the ease with which they will be *automatically* supported or negated in

relevant contexts. Nature (apparently) easily brings about or accepts the rapid decay of entities which do not fit in with its (apparent) unification.

'Wrong' ideas, however, are in another class, as we are all too aware (even if the 'wrongness' is simply a function of our own restricted point of view as compared to that of someone else). They can even approach achieving infinite lifetime. I note in this context that the International Flat Earth Society is still very much in evidence (see, for example, http://www.talkorigins.org/faqs/flatearth.html for admittedly rather biased comment). This possibility, or rather certainty that disprovable ideas can nevertheless be perpetuated, is another part of my difficulty with your suggestion that "*there is no ultimate ideal model*".

Edwina:

I think this is an important point. You are stressing the necessity of imagination in the development of reality. I fully agree with you – and suggest further that this imaginative 'Mind' capacity is not confined to humans but is an aspect of the whole universe. The universe is capable of evolving, imaginatively, and there is no end point to this evolution. What I meant by 'no ultimate ideal model' is that there is no *a priori* or even *a posteriori* ultimate model.

Ron:

I certainly agree in general terms that "*The universe is capable of evolving, imaginatively*", although I would hesitate to attribute to it a global character which goes beyond the apparent possibility of local-to-and-from-global correlation, corresponding to the (approximate) workability of Newtonian modeling.

"*No a priori*" ultimate model - is an issue I am unqualified to deal with.

No "*a posteriori ultimate model*" seems unlikely: I think we all use some kinds of 'ultimate ideal models' – whether justifiably or not – in dealing with our surroundings.

A third part of my difficulty with "*there is no ultimate ideal model*" lies with the *usefulness* of modeling, as a simplifying way of dealing with a multitude of (different) "*singular instances*". Some singular instances are more closely interrelated than are others. For these, an approximate 'representative instance' (i.e. a model) can often be formulated which is sufficiently close in character and effect to all of its individual precursors to replace them in a wide range of situations (or, rather, singular instances of

situation). The trade-off here is between accuracy and speed, to reduce reaction time in the face of dangerous, unpleasant or inconvenient stimuli, and its use is most certainly not inconsequential. This is a technique which is hard-wired into our own brains in the form of *fear-learning*, where the amygdala provides access to both rapid responses (from the visual thalamus) and accurate representation (from the cortex). The cortex pathway involves many more neuron-to-neuron transitions, and is much slower than the thalamus path (see Davis, M., *The Role of the Amygdala in Fear and Anxiety*, Ann. Rev. Neurosci. 15, 353-375, 1992 and LeDoux, J. E., *Brain Mechanisms of Emotion and Emotional Learning*, Curr. Opin. Neurobiol. 2, 191-197, 1992). Our species has survived and evolved until now *primarily* through the use of reductive (i.e. simplifying) modeling (i.e. partially-abstract representation) to permit us to escape annihilation. As a result, we have developed sufficient versatility in the use of abstract logic to carry out discussions such as our present one. "*Ultimate ideal models*" are the *very substance of abstract logic*. This complete discussion is constructed entirely from *ultimate ideal models*!

Edwina:

I think this is a simple problem of semantic dust. We are confusing the meaning of 'ultimate'. Both of us accept that models are necessary. My point is that there is no Pure Final Ideal Model! That's all!

Ron:

To summarize, I view the use of complementary ex-realistic modeling as a pre-constructive attempt at bounding all likely future stimulus-reaction requirements, under the controlling presupposition that every possibility has been foreseen within an incompletely known environment! As such, an ex-realistic framework (e.g. "*reality … (which) … operates as BOTH a wave and a particle*") is a formal one, which is incapable of resolving unanticipated events. Its use is *not* as a final and unquestionable definition of reality, but as part of our progressive attempt to achieve the greatest range of satisfactory stimulus-reactions as we can without running too big a risk. It is *never* infallible. Modeling follows the imperative '*as if*', and not 'what *is*'.

Edwina:

Agreed. And that's it, for our discussion.

Ron..... and..... Edwina