PHRONESIS part 1

Is current human consciousness an end point in the evolution of mind?

ABSTRACT: *If the human mind is a product of evolution, is it not prudent to consider how and in what way it might evolve in the future? Given the order of magnitude that appears to distinguish the minds of mankind from those of its closest animal relative, how significant might a new level of mind evolution be and what would be its unique distinguishing features? In this paper, I present a reductive explanation of phenomenal experience and demonstrate its compliance with exhaustive philosophy criteria. Further extrapolation of the explanation leads to a theoretical framework that elucidates the distinguishing characteristics of the next evolutionary step of the human mind. The reductive explanation aligns closely with our understanding of the evolution of life on earth so that examination of the explanation is also open to multidisciplinary interpretation and discussion.*

1. Overview

Consider the following:

Light striking the eye's retina differs from when it strikes any other surface. Instead of the light energy just interacting with the surface through absorption and reflection, the specialised and ordered structure that is the brain translates the light impulse, via the retinal nerve, into a neural format. Following conversion into its neural format, the light energy travels throughout the brain and is fed, filtered, conjoined, terminated, expressed etc. With multi-mechanisms like these, the brain transforms energy into temporal and spatial neural relational representations that generate the realisation of the structure's own existence as a physical body within the environment. In this way, the energy maintained within the entire system, leads to a recognition and development of an individual's 'concept of reality' based on the information it has collated via its senses (more on this later).

The brain is a high level example of an evolved structure that dissipates various forms of energy in a controlled and ordered manner. But the brain is not the only physical structure that has the capacity to control the dissipation of energy. There are lower levels of structural organisation that dissipate energy in an ordered manner too. Importantly, these lower levels are related to or have a relational status with the higher levels. It is the nature of this relationship that I will identify and explain in a manner that will provide a reductive explanation of phenomenal experience.

There are two objectives to this paper:

1. Firstly, to introduce and outline a dynamic systems model which I call the 'Hierarchical Systems Theory', which provides a reductive explanation of phenomenal experience and an explanation of the evolutionary foundations behind consciousness; and

2. Secondly, to advance a possible future mind state by extrapolating its principles.

We begin with an appraisal of the philosophy that indicates what requirements are necessary of a coherent reductive explanation of phenomenal experience. These stipulated requirements will be referenced throughout the main body of the paper. Following this is a brief historical perspective to the science that seeks to explain complex organic systems. Then, 'Hierarchical Systems Theory' (HST) is described in detail. The paper concludes with an extrapolation of a future mind state.

2. An appraisal of the philosophy that determines the necessary requirements of a reductive explanation of phenomenal experience

The Philosophy of Consciousness and the Problem of Phenomenal Experience

Deciphering the requirements of an explanation of ‘consciousness’ is a discipline in itself because it is unclear as to what is being referred to when considering the question, ‘what is consciousness?’. This is evident when one considers the plethora of attempts to explain consciousness and explore the enigmatic features of phenomenal consciousness (e.g. Armstrong, 1968, 1984; Carruthers, 1996; Dennett, 1978, Flanagan, 1992; Gennaro, 1996; Kirk, 1994; Lycan, 1987, Nelkin, 1996; Rosenthal, 1986, 1993; Tye, 1995). Chalmers (1995) argues that there is a uniquely ‘hard problem’ in deciphering consciousness in that any theory must adequately explain the specific characteristics and the textural qualities of phenomenal experience. Some argue that such a problem does not exist, others that a reductive explanation is impossible (Chalmers, 1996, 1999; Chalmers & Jackson, 2001; Jackson, 1982, 1986; Levine, 1983, 1993, 2001; McGinn, 1991; Sturgeon, 1994, 2000), whilst Chalmers (1995) speculates in favour of a non-reductive explanation that would require the discovery of, an as yet, undiscovered psycho-physical entity or fundamental force with its own laws. Alternatively, some argue that reductive explanation is possible with claims by several to having already provided one (Carruthers, 2000a; Dennett, 1991; Dretske 1995; Lycan 1996; Tye, 2000a).

What then, are the considered requirements of an adequate explanation of phenomenal experience? What follows is a distillation of ideas as to what is required to make a theory coherent:

1. Carruthers (2000a; also c.f. 2004) argues in favour of a *reductive* explanation of phenomenal consciousness that should,

> 1. explain how phenomenally conscious states have a subjective dimension; how they have feel; why there is something which it is like to undergo them;
> 2. why the properties involved in phenomenal consciousness should seem to their subjects to be intrinsic and non-relationally individuated;
> 3. why the properties distinctive of phenomenal consciousness can seem to their subjects to be ineffable or indescribable;

4. why those properties can seem in some way private to their possessors; and
5. how it can seem to subjects that we have infallible (as opposed to merely privileged) knowledge of phenomenally conscious properties.

2. Chalmers (1995) proposes that a coherent *non-reductive* theory of consciousness is necessary and that it must satisfy his three evaluative criteria. To paraphrase, these are as follows:

1. Criterion A, the double aspect theory of information principle, requires that information is fundamental to consciousness, and corresponds to physical and to phenomenal features that are isomorphic. (Section 7.3, para 4).
2. Criterion B, the principle of organisational invariance, states that any two systems with the same functional organisation will have qualitatively identical experiences. Examples of such systems might include computer systems. (Section 7.2, para 1).
3. Criterion C, the principle of structural coherence, requires that the processes that explain awareness link structurally to the basis of consciousness by determining the relationship between that of which we are aware (and can report upon) and that of which we experience. (Section 7.1, para 11)

Crucial in the assessment of my 'Hierarchical Systems Theory', Chalmers states that an explanation of consciousness should explain the experience about which and with which humans are individually aware and report upon, and provide an appraisal of prevailing physical facts and show how these facts must lead to organisms that possess phenomenal experience.

3. Dowell (2007a) considers the arguments that both the analysis of phenomenal experience and reductive explanation is impossible using type-A and type-B physicalism methods. She does this by reviewing Jackson, Chalmers, and Gertler, on one side of the debate, and Block, Stalnaker, McLaughlin, and Hill on the other. Each offer a rival account of what, in the absence of analysis, would be sufficient to justify reductive explanation. Dowell (2007b) allays the concerns of the differing views by providing an *alternative* illustration of a strategy that she calls a type-C physicalism method, which demonstrates, importantly how phenomenal analysis is not necessary for an a priori entailment (e.g. the extrapolation of existing physical principles) to satisfy reductive explanation. This type-C physicalism is therefore, a deductive-nomological account explanation (Hempel, 1965; Carruthers, 2004, section 2.1). The Hierarchical Systems Theory may be interpreted as an example of a type-C method.

4. A type-C reductive explanation is one that Carruthers (2004) argues, is an ontic method that seeks to specify some significant part of a causal process and to describe the causal mechanism. Woodruff Smith (2001) too, seeks the principle aspects of a fundamental ontology, which he argues, should explore and explain the relationship between consciousness and, what he regards as the three key facets of consciousness namely evolution, physiology, and behaviour.

Hierarchical Systems Theory (HST) is an example of a type-C method of reductive explanation, because it links uncontroversial physical facts to uncontroversial phenomenal conclusions. Whilst the reduction describes the processes that lead to the emergent property of phenomenal experience, there is an argument to say that it explains only the object of consciousness and the characteristics that define it but not individuated consciousnesses. In answer to this objection, Hierarchical Systems Theory explains how the first person must exist as an emergent property of brain activity, but does not explain the 'actual' perspective that defines any single individual. So, HST still allows for a coherent refinement of what might be 'unknowable', as of McGinn (1991), and provides a new perspective of the mind body problem. Furthermore, one can also make a case that HST provides a teleological reduction of intentionality in determining the necessary compulsive 'conditions of satisfaction' (a case that I do not make here), which would provide the underpinning of any HST based artificial consciousness applications.

In summary, this reduction provides uniform consistency by showing an evolving systems-hierarchy that extrapolates from physics principles. Furthermore, it uniquely illustrates how the explanation can be theoretically and empirically evaluated, thereby dismantling all of Velmans' (2001 c.f. conclusion) criticisms that reductive physicalism ignores both the first-person phenomenological evidence regarding the nature of consciousness and the third-person evidence about how it relates to a world described by physics.

The theory also has bearing on First-order and High-order representational theories in that it formalises a dynamic hierarchical structure that facilitates and explains physiological and evolutionary connections. This answers questions posed by Carruthers (2000b) as to how and why transitions in the evolution of consciousness take place.

3. An historical perspective to the science that seeks to explain complex organic systems

3.1 The Science of Thermodynamics and the Problem of Order from Chaos

Schrödinger (1944) makes the observation that whilst the laws of physics "have a lot to do with the natural tendency of things to go over into disorder…. it is by avoiding the rapid decay into the inert state of 'equilibrium' that an organism appears so enigmatic." (Chap. 6, para 2 & 6). Superficially, it would seem that living organisms appear to contradict the second law of thermodynamics because life creates structure and order out of chaos. Despite the apparent paradox, Boltzmann (1886/1974) is clear that the evolution of ordered systems does not conflict with thermodynamic principles and Pieper (2000 para 2) clarifies the point by stating, "the synonymous use of the terms entropy and disorder represent a serious misunderstanding of thermodynamics." Thirty years following Schrodinger's observation regarding the enigma of ordered lifeforms, Prigogine (1978), another Nobel laureate, was able to demonstrate in his theory of dissipative structures that self-organisation can evolve spontaneously even within chaotic environments. Indeed, Swenson (1988, 1989) maintains that under certain conditions, ordered flows of energy will maximise the rate at which a system satisfies the second law thereby making it more effective at dissipating energy than chaotic flows.

Despite the advances of work relating to Prigogine's theory of dissipative structures, Corning & Kline (1998) give an in depth critique of the applications of the second law of thermodynamics to multileveled structures like biological systems, making a distinction between order and functional organisation. What Corning & Kline allude to is that understanding systems dynamics requires understanding the function of systems structures, which is not possible through the application of thermodynamic laws alone.

More recently, there continues to be optimism that the scientific fields of systems theory and cybernetics might somehow provide fundamental principles to explain not just the order that arises spontaneously from the complexities and chaos of the environment, but many of the sophisticated characteristics of organic lifeforms too (e.g. Barab et al., 1999; Corning & Kline, 1998; Jorgensen & Svirezhev, 2004; Schneider & Kay 1994; Swenson, 1997).

3.2 General Systems Theory and the Problem of Information

Over thirty years before the first journal devoted to complex systems was to publish its first paper, Bertalanffy succeeded at introducing his General Systems Theory in the British Journal for the Philosophy of Science (1950) and Human Biology (1951). From these seminal papers are two points of particular relevance to this paper:

1. The laws of thermodynamics apply to closed systems, but *not to open systems* - Importantly, the environment with which lifeforms interact, is open.
2. With complex systems such as living organisms, there is some aspect of 'self-regulation' or self-organisation that entails feedback or the *transfer of information*.

A key to understanding systems behaviour therefore relates to the concept of information transfer and the way it is self-regulated:

- What is meant by the transfer of information?
- How does the information of one system relate or differ to another?
- In what way is information traded for stability?
- Why is the transaction process self-regulatory?
- Why is this a universal principle for all systems
- What are those universal principles?

Adopting Bertalanffy's lead, Kuhn (1974) proposes that all systems tend toward equilibrium through communication (where communication translates as the exchange of information) and transaction (involving the exchange of "matter-energy"), and that a prerequisite for the continuance of a system, by *controlled or uncontrolled* means, is its ability to maintain a steady and stable state.

To develop the thoughts of Kuhn further, if one assumes that system stability arises through the transaction of information by controlled or uncontrolled means and that this transaction is in some manner self-regulatory, is it possible to describe a model that conclusively answers those key questions above relating to the regulation and transfer of information?

4. Introducing The Hierarchical Systems Theory

4.1 What is a system?

A system is an open state that is composed of interacting and interdependent parts whose combined dynamic relationships determine coherent, stable functional behaviours:

Any given system exists by virtue of its component dynamic stability because without stability the interacting parts cease to maintain their coherent systems behaviours thereby becoming separate entities. One might say that a system must demonstrate dynamic stability in order to define its existence.

4.2 Systems stability and interaction

Coherent functional behaviours are conditional on system stability. Inevitably, any given environmental interaction has the capability of disrupting either system stability directly, or some of the interdependent parts upon which a system relies for its own stability. One might reasonably conclude that when a system interacts with elements within the environment, a process takes place that leads to a realignment of systems stability. This realignment may lead to two distinct types of reaction:

> 1. When the realignment of stability is ordered, a system demonstrates its structural function by actively dictating the nature of a stabilising reactive outcome.
> 2. Alternatively, when the realignment of stability is disordered, a system's response does not demonstrate its structural function, and the system passively acquiesces to a new reactive equilibrium. (More on these points later).

This realignment of stability may also lead to two distinct consequences:

> 1. Systems behaviours, be they ordered or disordered as of point 1 and 2 above, arise from dynamic reactive structural re-evaluations. These re-evaluations always result in some form of stable state outcome, even should that state be brief and/or transitory.
> 2. Systems behaviours are indicative of the displacement or conversion of energy from one state to another. When the conversion of energy is ordered, one can define that conversion specifically as, the movement of information. (More on these points later).

4.3 What is an hierarchical system?

The Hierarchical Systems Theory states that under certain conditions, a system may comprise of interdependent parts that have an identifiable hierarchical status that has characteristics that are unique to that system's construct. Theoretically, any systems dynamic has the capacity to evolve a unique and formal relational systems hierarchy or a hierarchical systems dynamic.

Before I provide a detailed exposition of an hierarchical system, what follows, are a couple of illustrative examples to explain further the difference between a standard system and an hierarchical system:

4.4 How does an hierarchical system differ from a standard system?

Standard systems evolution

Take a scenario where, for example, the structure of a system (S) reacts to a certain type of interaction in an ordered manner and a second type of interaction in a disordered manner. (We can label the former as interactions type-A and the latter as interactions type-B). In other words, accepting points 4.2 above, type-A interactions lead to the system demonstrating its structural function whilst type-B interactions lead to chaotic systems dysfunction. Subsequently, if system S's reaction to a type-A or B interaction were coincidentally to lead to the modification of its structure such that it could then react to both type-A and B interactions in an ordered manner, that systems structure would have acquired a new capability. This capability would be self-perpetuating because it would enable system S's structure to stabilise interactive behaviours with both type-A and B interactions. Furthermore, the structural reaction would inevitably be positively selective thereby indicating that system S, as with all standard systems, would demonstrate the potential to evolve over time and develop increasingly complex structures and functional behaviours.

Hierarchical systems evolution

A hierarchical systems structure arises under exceptional circumstances when the functional complexity of a system evolves to the point where some aspect of its functional dynamic becomes a separate yet dependent system state with its own unique class of environmental interaction: Given the same scenario above, consider a situation where system S evolves such that its systems function responds favourably to increasingly diverse types of interaction from type-A, B; and C through to type-Z. In doing so, standard system S becomes a complex systems structure because of its extensive array of ordered behavioural function. A hierarchical systems dynamic can then arise, if this complex behavioural array evolves its own unique subset of system-to-environment interactions. (We can label these interaction types as type-A1 through to type-Z1). In response to this new class of interaction, a sub-structure of system S can evolve systems functions that are entirely distinct from the standard system S. What makes these systems functions hierarchical is that despite their behavioural independence to standard system S, their existence is still dependent on the coherence of system S interactions.

The hierarchical systems dynamic that explains the phenomenon of experience that humans call consciousness

It is difficult to evaluate a theoretical illustration like this without concrete examples. Consequently, the main focus now is to analyse an actual example of a hierarchical system. The three main objectives to this analysis are to,

1. Give a clearer indication of what a hierarchical systems dynamic entails beyond the illustration given above;
2. Demonstrate the underlying unity of the Hierarchical Systems Theory and indicate how this unity explains great complexity; and
3. Provide a coherent reductive explanation of phenomenal experience by satisfying the necessary philosophical requirements.

5. Extrapolation of Hierarchical Systems Categories 1 to 4

5.1 Systems Category 1

Perception States

A compound atomic structure is an example of a system whose stability is dependent on its component atomic elements and they in turn are dependent on the stability of more fundamental atomic forces.

It is said of atomic compounds that they *react* to elements within the environment. But when speaking of systems structures, of which an atomic compound is an example, one must first consider that they *interact* with the environment. To say that a system and its environment interact, rather than react, is to acknowledge that there is a two way process where both parties accommodate the other to some extent and where some form of exchange of energy takes place between the two. Consider the following:

The *interaction* between a system and its environment is a process through which (*per*) a system's structure embraces (*capere*, to seize or to take hold) and then *reacts* to the experience.

In this statement, the use of the term interaction, allows for the proposition that a system 'embraces' or 'takes hold' of its experiences before the institution of reaction. Thus one can continue with the following:

When a system experiences and then reacts, its 'interactive' behaviour is demonstrating environmentally *perceptive* characteristics (i.e. Where the term perceptive is derived from *per-capere*, meaning; through which the system seizes or takes hold).

This is an unconventional definition of perception because it applies equally to inanimate systems structures as it does to the more usual references of those experiences gathered by the specialised sensory organs of living organisms. The concept of mutual interaction between system and environment allows for the notion of a system embracing experience.

But this is not all there is to this definition of perception. Recalling section 4.2, it was stated,

When a system interacts with elements within the environment, a process takes place that leads to a realignment of systems stability. This realignment may lead to two distinct types of reaction:

1. When the realignment of stability is ordered, a system demonstrates its structural function by actively dictating the nature of a stabilising reactive outcome.
2. Alternatively, when the realignment of stability is disordered, a system's response does not demonstrate its structural function, and the system passively acquiesces to a new reactive equilibrium.

What follows is an examination of the two distinct types of perceptive behaviours:

The Distinction between Passive and Active Perception States

Passive perception **-** When a system, such as an atomic compound, interacts with its environment in an ordered manner, its behaviours characterise the system's coherent function. When behaviours do not characterise a system's coherent function, then the system is not in control of the reactive equilibrium that must ensue following that particular interaction between system and environment. When this occurs, the system may either be permanently compromised structurally or cease to exist.

Permanent structural compromise invariably leads to permanent systems dysfunction, but it can also result coincidentally, in functional advances that influence the evolution of that system's structure. However, under these circumstances, one might say that the evolution of the system is 'outside' of its control. Structural advances only occur when the system's function has been initially negated and where there is no systems control over the re-acquisition of stability.

But imagine if a system could be capable of retaining *active* involvement in the evolution of its systems structure even during disordered and dysfunctional interaction. How could such a systems structure be possible?

Well, one can appreciate that increasingly complex compounds can evolve as an accidental consequence of environmental interactions and that this could lead to the evolution of some special systems characteristics. What process or systems characteristic could evolve, whose functional behaviour would ensure that it maintain active involvement in its chaotic or disordered environmental interactions?

Active perception - Unlike other systems structures that merely react, there is a system type that uniquely, actively dictates its structure's reactive capability, even under the duress of chaotic and disordered environmental interactions.

One of these system types belongs to the polynucleotide family and include ribonucleic acid and deoxyribonucleic acid:

A system's structure is a physical representation of its systems construct. If a system's structure can replicate, then that systems construct is expressed in perpetuity.

The ability to replicate affords a structure a unique characteristic and status because structural replicates determine the nature of their particular individual system's development *through successive generations*, even after the parent structure dissipates and ceases to exist.

A replicating system encapsulates its perceptions *actively* by enabling the progressive evolution of its particular structure. Environmental interactions do not just happen and then end as is the case with passively perceptive systems, but have an impact on a replicating system's structure that transcends an individual structure's lifespan through its successive generations. A replicating system is *adaptive*, whilst other types of systems are merely *reactive*.

Actively perceptive systems seek stable structural adaptation

Whilst the requirements of a passively perceptive system are merely to seek structural stability during environmental interaction, the structure of an individual replicating system represents a snapshot in time of an evolving systems state whose requirements are to acquire and maintain a stable reactive adaptation. Consequently, for each new generation, the interactions of replicating systems lead to structural mutations, which represent new stable adaptations of that particular system over time.

The oldest replicating system found on earth is a 3.5 billion year old fossilised bacterium, identified in 1993 by Schopf (1999). Following the first evolutionary explosion of the Big Bang, but ignoring the evolutionary effects of early phase transitions that defined the nature of matter and space, the capacity to duplicate marks the start of a second momentous evolutionary event. Coren (2001) is an independent proponent of this descriptive analogy and suggests coincidently in his analysis of the empirical evidence for a law of information growth, that there could be a relationship between cosmological evolution, life on earth, human culture, and thermodynamics. There is no reason to suppose that the capability to replicate has only happened on earth, and Bennett et al. (2003) conclude that it has probably occurred on thousands of other planetary systems. This momentous evolutionary event began on earth through passive perception and the unintentional evolution of compound atomic structures that could replicate.

5.2 Systems Category 2.

Consciousness States

In the previous 'Systems Category 1.' section, the intention was to introduce a few key concepts:

1. The first was to introduce the notion that perception is not a characteristic limited to 'living' organisms that 'sense' the environment, but that all systems structures that engage with and react to the environment are also per-ceptive.
2. In order to clarify point 1, it was necessary to determine in what way and by what means one could distinguish the perception of systems that might be regarded as 'not alive' with that of living organisms. 3. This distinction is explained with the concept of passive and active perception states.
4. Finally, it was necessary to describe the mechanisms behind the passive and active perception states and explain how and why they relate and naturally progress from one to the other during the course of evolution.
5. In conclusion to category 1, there is a description of actively perceptive systems as structures striving uniquely for a 'stable structural adaptation'.

In the following section, an examination of the unique characteristics of category 2 organisms begins with an exploration of the concept of information as it relates to complex organic structures. In doing so, the intention is to demonstrate how Hierarchical Systems Theory complies firstly with Carruthers' requirements of an adequate explanation of the phenomenon of consciousness, 2.1.1 and 2.1.3 above, specifically regarding the subjective dimension of "phenomenal states" and its ineffable or indescribable nature, secondly with Chalmers' criterion A double aspect theory of information principle, which requires that information is fundamental to consciousness and corresponds to physical and to phenomenal features that are isomorphic, and finally with Chalmers' criterion B principle of organisational invariance, which states that any two systems with the same functional organisation will have qualitatively identical experience:

The concept of information as it relates to complex organic structures

The unique replicative characteristic of actively perceptive category 1 systems ensures the evolution of increasingly complex structural adaptations.

Consider the following statement:

Structure and behaviour are the physical embodiment of a complex organic system's 'understanding of the environment'.

Clearly, in the context of this statement, understanding is not of the kind that one might associate with reasoning or informed decision making. Rather, it is by virtue of the complex structures and behaviours *themselves*, that organic systems structures demonstrate that they possess a certain *understanding* of the environment:

For example, the complex nature of creating sugars from light, water, and carbon dioxide indicate that the evolved biochemical structures of plants exhibit the knowledge that enables photosynthesis to take place.

Accepting that organic systems have a physiologically encoded understanding of their environment or knowledge about the environment, can be expressed alternatively by saying that systems structures are a form, or type, of information construct.

This is relevant to Chalmers' criterion, where information is necessarily a fundamental feature of a coherent explanation of consciousness (1995, section 7.3, criterion A). As here, Dennett (1995a) also argues that adaptation is a form of knowledge. He suggests that any functioning structure carries implicit information about the environment in which the function operates. Dennett does not then conclude the following:

It is with (*con,* with) its biochemical structure that a biological system expresses its knowledge (*scire*, to know). Alternatively; biological systems structures are *con-scious.*

This definition is emphatically not a call to panpsychism, but granted, the formal definition is over simplistic. After all, in its present form it offers no insight into what we commonly associate with what it is to be conscious. Furthermore, the definition may feel intuitively wrong, because knowledge is more readily associated only with thinking processes derived from neural mechanisms. However, there is more to this definition than at first meets the eye (c.f. below). What the definition does at this stage, is simply link information to a basic interpretation of consciousness. This provides the foundations from which it will be demonstrated how consciousness is an emergent property.

An incorrect inference from the definition might be that any structured series of biochemical processes, for example, chemical pumps, feedback mechanisms, inhibitors, and receptors, can be regarded as 'conscious' because they encode information that relates to their system's interaction with the environment. However, it is the replicating system and its interdependent parts that are conscious according to this definition, not each of the interdependent parts themselves. In order to tighten the definition further one must re-state with the following:

A systems structure is conscious if its component parts are the intrinsic interdependent elements that define a system's structure and when the system's behaviours arise from the structure's adaptation to environmental stimuli.

This clarification creates the necessary division between organisms that one might say, possess *any degree* of consciousness and manmade allopoietic structures, of which thermostats (Chalmers, 1994), buckets of water (Searle, 1983) or current computerised applications are examples. Manmade allopoietic structures are artificially organised constructs designed to give the *appearance* of or to *mimic* the behave of coherent uniform systems. But a thermostat or bucket of water is no more a systems structure than, for example, a person and the house in which they live. Both house and person are organised structures, but putting them together does not create a uniform system. When the person is in the house, that individual's environmental parameters are controlled and restricted by the house, but combining the two does not constitute a systems structure. Computer software likewise is constructed by combining non-relational elements to create organised syntactic actions, but these characteristics are present in the absence of a functional systems construct. Searle (1980) argues a similar point with his Chinese Room Argument thought experiment. The thought experiment starts by supposing that if we were to give a program that gives a computer the ability to carry on an intelligent conversation in written Chinese to an English speaker, and they were to execute the instructions of the program by hand, then, in theory, the English speaker would also be able to carry on a conversation in written Chinese. However the English speaker would not be able to understand the conversation. So, Searle concludes, a computer executing the program would not understand the conversation either.

The intention so far, has been to describe a relationship between systems structure and knowledge thereby providing only a preliminary account of how information relates to our initial definition of consciousness. This relationship is necessary for the theory to comply with the first part of Chalmers' double aspect theory of information principle, which is that information is fundamental to consciousness (c.f. 2.1 above - Criterion A). The second part of Chalmers' double aspect theory of information principle (Criterion A) states that information corresponds to physical and to phenomenal features that are isomorphic. It is to this second part of the principle that attention turns in the following section which clarifies the previous definition of consciousness:

Information acquisition and the distinction between passive and active consciousness states

As stated previously, when a system interacts with the environment it will either maintain system stability and demonstrate its structural function by behaving in an ordered manner, that is, in a manner consistent with that system's structure, or the system's dynamic will reacquire stability in a disordered manner whereby the system's structure and system's integrity is compromised. We can explore this concept in relation to consciousness as follows:

Replication and mutation are processes that ensure that a system's physiology adapts to the environment over time, as of category 1 organisms. However in these instances, it is not its replicating structure but environmental selection, that determines the nature of the knowledge that a structure's physiology *acquires* from one generation to the next. A replicating organic structure does not have the capability of dictating the means by which it acquires complex environmental knowledge. In other words, a replicating system acquires information only passively, over generations. Thus, when reaffirming the previous definition of consciousness, i.e. that it is with (*con,* with) its biochemical structure that a biological system expresses its knowledge (*scire*, to know), we see with clarity that the conscious state of a replicating organism is static because it acquires knowledge not as a function of its system's dynamic, but entirely by accident over generations. This dilutes the definition of consciousness significantly until one acknowledges its active form or state:

There is an active capability whereby a complex organism can actively influence the acquisition of its knowledge. This state has evolved unintentionally in response to the survival advantages afforded by the structural adaptations of category 1 systems structures. A system acquires this active capability when it has the facility to immediately and directly evaluate environmental conditions. Such capability enables its individuals to instantly adapt their behaviour in light of their environmental understandings, rather than rely on innate responses and evolving physiological adaptations. This active state is effected by the biochemical mechanisms of the neural networks and sensory organs of animals.

A neural network is a biochemical structure that is capable of encoding knowledge of environmental experience. The significant difference between the knowledge that neural networks acquire over other forms of physiologically structured knowledge, is that understandings about the environment that are encoded by neurones can evolve *spontaneously* and *instantly* in response to localised experiences. Spontaneous responses to the environment potentially have the benefit of enabling *behavioural* rather than evolutionary adaptation.

Actively conscious systems seek a stable understanding

Although interactive neural processes evolve from the replicating mechanisms of category 1 systems structures, their systems functions are uniquely distinctive.

An important characteristic of any systems structure is that its dynamic interdependent parts must be able to maintain stability for the systems structure to exist (c.f. 4.1 above). Applying this principle to category 2; neurally encoded understandings of the environment represent a stable systems state. However, environmental conditions have a continually destabilising effect on neurally encoded understandings. Thus there is a constant realignment of the stability of the understandings that neural structures encode in response to environmental interaction. This desire for systems stability is what creates the semantic derivatives for all a system structure's syntactic mechanism. This derivation is the feature that is lacking in existing computational modelling of artificial intelligence (Searle, 1980) but is what is required to determine the macro-intentionality necessary for the functional operation of an artificially conscious system. An artificial system modelled in this manner, would not apply algorithmic calculations that have a finite number of steps or that would derive solutions using logic gates. Instead, such systems would apply the conditions of satisfaction relating to the requirement for spontaneous realignments of stable understandings.

Analysis of behaviours or of mechanisms of thought in themselves, give no insight into consciousness. Rather, it is the intentionality that determines the behavioural observations and the application of suitable mechanisms. Hierarchical Systems Theory provides the necessary understanding of those intentions in terms of a system's demands for stability, which is why I stated in section 2 above that one can make a case that HST provides a teleological reduction of intentionality which would provide the underpinning of any HST based artificial consciousness applications.

The effect of spontaneous realignments of understanding

A constantly changing environment ensures that neurally encoded understandings of the environment are in permanent flux. This fluctuating neural description of the environment does have an effect. One might describe that neural effect, which is propagated in realtime, as 'environmental sensation' or in Kant's terminology, 'intuition' (see 'Comparative evaluation and Kant' below). The following commentary attributes the phenomenon of feeling to this sensation:

As a defining statement, one can say that phenomena of feeling are a neural effect brought about by the realignment of stable understandings (c.f. next paragraph).

To qualify this statement what is meant by 'stable understandings' and by 'phenomena of feeling'?

The term 'stable understandings' is interpreted broadly as any accurate evocation of knowledge, be it accrued or experienced. This neural 'knowledge' can consist of great complexity in experiential evaluation and in neural processing but does not utilise *any* conceptual thought. That there is no conceptual thought but a much neural activity explains the ineffable characteristic of the phenomenon of feeling. (c.f. Carruthers' requirements of an adequate explanation of the phenomenon of consciousness, 2.1.1 and 2.1.3 above, regarding the subjective dimension of "phenomenal states" and its ineffable or indescribable nature). This thesis provides an alternative explanation to Kant's view that *judgements* of taste are non-conceptual in derivation.

The term 'phenomenon of feeling' in this context, is not that which one might associate with human concepts of ‘what it is to have feelings’. Feeling here refers to an effect arising from a process of restabilising neural responses. In itself, the effect has no experiential or even contextual *status*. In other words, the feelings can happen prior to the individual forming any correlation with its thoughts or knowledge. Experiential status develops only when there are associations between 'that which is felt' and its causal internal and/or external environment. When these associations do take place there is a potential for comparative experiential evaluation (see 'Comparative evaluation and Kant' below). Notably therefore, and as with Kant, comparative experiential evaluation is driven by feeling and is not conceptual. On first thought, associative processes are what appear to drive the actively conscious to adapt their behaviour in the light of experience. However, what actually drives behaviour is the need for stable behavioural adaptation.

The HST model explains how information or knowledge can correspond to physical and to phenomenal features that are isomorphic, as required of the second part of Chalmers criterion A (1995, c.f. 2.1 above). The explanation is much more satisfactory than the speculative ideas proposed by Chalmers whose concepts are routed in a problematic mind body duality: "The double-aspect principle stems from the observation that there is a direct isomorphism between certain physically embodied information spaces and certain phenomenal (or experiential) information spaces" (1995, section 7.3).

Comparative evaluation and Kant

The term comparative evaluation is described equivalently by Kant (1781/1922) as follows:

> Now, when I draw a line in thought, or if I think the time from one noon to another, or if I only represent to myself a certain number, it is clear that I must first necessarily apprehend one of these manifold representations after another. If I were to lose from my thoughts what precedes, whether the first parts of a line or the antecedent portions of time, or the numerical unities representing one after the other, and if, while I proceed to what follows, I were unable to reproduce what came before, there would never be a complete representation, and none of the before-mentioned thoughts, not even the first and purest representations of space and time, could ever arise within us. (p. 102)

Such evaluations of concurrent processes in time that humans *and* animals create on a continual basis, *whilst awake*, are not conceptual in origin nor dependent on the phenomena of experience, this is agreed. However, in his description, Kant omits a vital aspect of the process. He talks only of those events that precede the present. But both the evaluative mechanisms of conceptual and non-conceptual thought entail the 'projection of possibilities', to varying degrees of sophistication. How else might a dog catch a ball or a bird land on a twig unless they project a line of possible outcomes in anticipation of the present. This process is what creates behavioural free-flow of the kind not observed in many erratic (innate) insect behaviours. This is a significant feature of human conceptual and aesthetic processes.

What HST indicates of 'feeling' and its correct interpretation

Thinking, comparative evaluation, or being knowledgeable about experience do not give an animal a mind’s eye view, inner wisdom, or self-knowing concept.

Consider the nature of communication in an animal that is only actively conscious of experience. In this state, an animal can express itself only by communicating its innate responses to stimuli and by communicating some form of expression regarding the phenomenon of its feelings:

The evolution of the communications of feelings and their relationship to environmental experience can lead to increasing complex social behaviours and to distinctive individual and social stances. It is these behaviours and stances that humans interpret as 'emotions' using their unique and particular conceptual framework. But for a category 2 animal, there remain no defined realisations as to the significance of any given feeling regarding its expression or interpretation, or any particular insights regarding the relationship between an expression and learnt associations. In the absence of conceptual representation, an animal such as this cannot begin to communicate any form of conceptual understanding or form a view as to what such an expression means 'emotionally'. Consequently, this phenomenal state of being actively conscious of perception does not embody the notion of what it is to be a human that is *aware* of the phenomenon of experience.

The complications of the human perspective regarding feeling are due to the reasoning that arises from its *conceptual* rationale. In this vein, Gunther (2004,) argues, "by *introspecting* [italics added] on what we feel, we learn to recognise what emotional attitude we're experiencing." (p. 44) This view is shared by de Sousa (2003) who suggests, "the specific nature of my emotion's formal object is a function of my *appraisal* [italics added] of the situation." (p. 1). Introspection and appraisal (as italicised) are distinct human attributes that alter interpretations of the status of feeling on the one hand, and emotion on the other. In support of this, research by Nielsen (1998), and the reassessment of Damasio (1994, 1999), indicates that human creative, reasoning, and problem solving processes utilise the evaluation and assessment of emotions rather than purely the emotions themselves. Kaszniak (2001) also highlights research to show that functional aspects of emotion operate outside "conscious awareness".

Artificial consciousness and the principle of organisational invariance

The principle of organisational invariance (c.f. 2.2 Chalmers' criterion B) states that any two systems with the same functional organisation will have qualitatively identical experiences. Theoretically, a hierarchically based systems-model founded on the principles established by this paper would create a self-perpetuating artificial state whose functional organisation would generate structures with qualitatively identical experiences to conscious animals. This is the case because the theory provides the necessary intentionality that underpins the causal mechanism that instantiates the necessary syntactic neural mechanism, (as required of successful artificial intelligence applications according to Searle, 1980). Empirically, the duplication of this intentionality, which is derived from the need for systems stability within the hierarchy of categories, is necessary in proving compliance with Chalmers' principle of organisational invariance (criterion B). In principle HST does hypothesise that artificial consciousness is attainable.

Active consciousness and its impact on evolution

The physiological impact of active consciousness is considerable because it alters adaptive behavioural parameters. These parameters influence rates of cerebral expansion and physiological development:

In their analysis of complex systems, Hinton & Nowlan (1987) demonstrate that "learning organisms evolve much faster than their nonlearning equivalents"(p. 495). Maynard Smith (1987) also argues that learning alters the parameters of evolution. Complin (1997), who examines the mechanics of adaptation using computational experiments and a wide array of literature from biology and evolutionary computation, concludes that learning is a mechanism that leads to the extension of the boundaries of behavioural adaptation.

Unsurprisingly, the ordered and disordered systems dynamic, which led to the emergence of animals that were actively conscious of perception, marks the beginning of a third evolutionary explosion. This explosion began when multicellular organisms first developed the capability of experiential comparison and evaluation in wormlike animals of the phylum Annelida, about 540 million years ago. Initially, a basic form of chemical memory and evaluation fuelled a physiological explosion that followed from the expansion and specialisation of sensory organs and neural network mechanisms. This alternative explanation that Hierarchical Systems Theory provides, presents coherent and unified answers to the questions that Hameroff (1998) raises in relation to the Cambrian evolutionary explosion. According to fossil records, Hameroff states, life on earth originated about 4 billion years ago, but evolved only slowly for about 3.5 billion years during the pre-Cambrian period. Then, in a rather brief 10 million years beginning about 540 million years ago, a vast array of diversified life abruptly emerged during the period known as the "Cambrian explosion."

5.3 Systems Category 3.

Awareness States

The key points from the previous category 2 section are that,

1. Systems structures are a form, or type, of information construct.
2. The underlying function of the category 2 consciousness mechanism is to maintain stable knowledge.
3. One of the by-products of the mechanism is the creation of the phenomena of feeling.
4. Evaluations and associations between the phenomena of an individual’s feelings and its experiences leads to learning, where learning can be defined as the ability to make associations between the restabilising processes that generate feeling phenomena and the causal environment.
5. This complex neural mechanism requires the rapid comparison and prioritisation of experiential neural events upon whose coherence an organism’s survival may benefit.
6. For a category 2 animal, there remain no defined realisations as to the significance of any given feeling regarding its expression or interpretation, or any particular insights regarding the relationship between an expression and learnt associations.

In the following section, the relationship between consciousness and evolution, physiology, and behaviour is extended further. This is necessary to strengthen the case for, what Woodruff Smith (2001) regards as, the principle aspects of a fundamental ontology (c.f. section 2.4 above). Furthermore, HST increasingly establishes Carruthers (2000a; also c.f. 2004) requirements (2.1.1.to 2.1.5) of a reductive explanation. This section is primarily of interest because of the explanations that the unifying principles of Hierarchical Systems Theory will provide for a multitude of unique human characteristics. There will be insightful explanations of language, emotion, creativity, and social behaviours:

On the evolution of passive and active conceptual realisations

In the previous category 2, the suggestion is that animals have the capability of modifying behaviour in an ordered manner. This occurs when there is a systems structure whose existence compels the comparative evaluation of experience. Cognitive fluency facilitates this capability. Consequently, increasingly sophisticated cognitive function evolves because of its potential survival advantages, but obviously, organisms are not in direct control of this evolutionary process. The evolution of increased cognitive capability is incidental.

Additionally, an increasingly complex cognitive capability enables neural mechanisms to compare, not just the relationship between the phenomenon of experience and feeling, but the relationship between the phenomenon of experience and learning too, where the ability to learn is determined by the ability to make associations between the restabilising processes that generate feeling phenomena and the causal environment. One can consider the dynamics of this heightened neural mechanism as a systems construct and structure in its own right.

As with previous examples, when a system interacts, it will either maintain system stability and demonstrate its structural function by behaving in an ordered manner or the system's dynamic will reacquire stability in a disordered manner in which case the system's structure passively acquiesces to a restabilising reactive outcome:

In category 3, when understandings between the phenomenon of experience and learning are disordered, understandings are not recognised in terms of their relationship to the process of learning. There is no systematic interpretation of understandings and consequently, no conception of what understandings mean in the context of reality. In this situation, any potential conceptual realisations acquiesce and are but fleeting. Fleeting conceptual realisations can be observed in non-human animals. This notion is remarkably consistent with Kant's thoughts as described in a letter to Herz:

> [If I had the mentality of a sub-human animal, I might have intuitions but] I should not be able to know that I have them, and they would therefore be for me, as a cognitive being, absolutely nothing. They might still... exist in me (a being unconscious of my own existence) as representations..., connected according to an empirical law of association, exercising influence upon feeling and desire, and so always disporting themselves with regularity, without my thereby acquiring the least cognition of anything, not even of these my own states. (Bennett, 1966, p. 104)

My Hierarchical Systems Theory explains fully why Kant's intuitive ideas expressed here are implicitly correct. But the Hierarchical Systems Theory enables us to delve deeper:

If the neural system responsible for under'tanding evolves to a level of sophistication whereby it begins to develop an evaluative process that actively establishes a neural systems state that relates phenomenal experience with learning itself, then that systems state becomes an ordered structured mechanism in its own right.

Recognitional concepts and the emergent appreciation of needs, emotions, and feelings

An ordered category 3 mechanism recognises and identifies a relationship between learning and experience. What is the significance of this relationship?

To recognise a relationship between learning and experience is to develop a conception of reality's functional relevance:

For example, any animal may learn or find out by accident, that apples fall from trees, but only by recognising this in a conceptual framework can that animal reason, as might a human, that throwing a stick at a juicy apple in a tree that is beyond reach, might bring the apple down to within its grasp. In fact the human can apply the conceptual principle to scenarios where the object of reference is not the subject of their immediate need or desire. Such conceptual understandings are conferred only through evaluating the associations between learnt understandings. (c.f. Loar (1990) Carruthers (2000a), and Tye (2000b) on phenomenal concepts).

In animals, learning and feelings are a derivative of complex associations. However, animals need not develop a realisation as to the significance of any given association. To do so, is to recognise the *functional* nature of that association. For example, an animal may learn that putting a stick in a tree crack and twiddling it about reveals a grub that satisfies its hunger. However, it has not made a conceptual association regarding sticks and satisfaction. To do this, it must make an association between objects that, in general, can function as tools for a variety of purposes to achieve a myriad of satisfying outcomes. Such a realisation is what leads to the development of generalised, and ultimately creative, concepts about tools in general and satisfaction.

The proposal is that a complex interdependent conceptual map evolves from a realisation of objective functional properties in view of the emergent appreciation of an individual's desires, feelings and understandings. These come to form an individual human's recognitional concepts. The Hierarchical Systems Theory explains that the process relies on several systems layers:

1. Firstly, it relies on the ordered evolution of structures that stabilise experiential reaction.
2. Secondly, it relies on the ordered evaluation of the phenomenon of feeling and experience.
3. Thirdly, it relies on the ordered recognition of the phenomenon of learning and experience.

Fundamental concepts

Concepts are not static for any given individual, but evolve from an early age. As they form, they do so in direct correlation with those environmental properties that induce desires and feelings. These actual environmental properties about which humans have desires, feelings and concepts, are spatial and temporal. Thus the sense of the spatial and the temporal are entwined with the concept that time and space exist and that experiences take place within its rich tapestry.

The concepts of space or time are fundamentally about relations between particular objects, within a world view about which an individual is phenomenally conscious. Consequently, concepts do not have to be conceived within a verbal language. A concept can be based on any 'relation of types'. It is these relation of types that determine the relationships between of the extrinsic properties of all known things, but which can never determine the intrinsic nature of things in themselves.

If I close my eyes and imagine the room in which I sit, my verbal and artistic languages are limited in defining the *conceptual* object of that space, but I can speak about the *atmosphere* in terms of how I feel emotionally about the space, and I can speak about perceptual content in a retrospective and colourfully evocative way. Thus my aesthetic experience is divided into different elements that I can decipher imaginatively if a little inaccurately. But the image in my imagination is interpretative, when I try to conceive of its elements and speak about them. If I am unable to conceive of them, as might a nonhuman animal, the space and the time is not represented conceptually. This is not to say that an animal is not capable of imagining contents contextually, it just does so without a concept of their relations. Note, concepts do not have to be conceived within a verbal language. A concept can be based on any 'relation of types'. It is these relations of types that determine the identities of the extrinsic properties of all known things, but which can never determine the intrinsic nature of things in themselves.

The emergence of the phenomenon of reality

There is one concept that is more profound than any other and that is the *recognition* of the phenomenon, reality. I say that it is profound, because it is by recognising the phenomenon of reality that an individual human comes to recognise itself as a conceptual being that exists as part of that spatial and temporal world view. This recognition leads to an emerging identification of the concept of self and to an active development of an awareness of the conscious state. In the grand scheme of a personal identity, an emerging conceptual map generates concepts about phenomena and ultimately to the recognition of phenomenal experience as a 'condition' of the self. The same is expressed by | (1781/1922), in 'Of the synthesis of recognition in concepts' (para. 10):

> ...the original and necessary consciousness of the identity of oneself is at the same time a consciousness of an equally necessary unity of the synthesis of all phenomena according to concepts, that is, according to rules, which render them not only necessarily reproducible, but assign also to their intuition an object, that is, a concept of something in which they are necessarily united. (p. 108)

Languages are a by-product

Being actively aware of the conscious state has a powerful effect on communication. Whilst the communication of only emotional attitudes in category 2 conscious animals can involve complex sounds and gestures, the communication of conceptual reality in category 3 humans is an entirely different proposition: The construction of a conceptual realisation is what *compels* a human to formulate any suitable framework that can effectively communicate it. That universal suitable framework of languages is a grammar that facilitates the identification and relation between the objects and functions relevant to the conceived reality. Consequently, an individual's language develops *in response* to its maturing concepts and their descriptive relevance:

Here in lies a coherent and far more plausible alternative interpretation of the findings that led Chomsky (1988) to suggestion that language arises through a realisation in the brain of an innate language faculty, or "language acquisition device" that switches on during language development. Hierarchical Systems Theory explains that language and its structural constructs are merely an intrinsic by-product of the dynamics arising from being actively aware of consciousness. Language *arises* from the compulsion that individuals have to persuasively communicate their stable concept of reality.

This is not to say that communicating conceptual reality is the only function of language:

In category 2, it is the expression of feeling rather than language that is the by-product. Feeling can lead to learning, if an animal can make an associate between any given feeling and the experience that caused it. This is the added benefit or *potential* of the category 2 state. Similarly, in category 3, the by-product of language as an instrument for the expression of conceptual reality, has further developmental potential. This potential is realised through the association between concepts of reality and aspects of creative thought, and aspects of social and environmental influence, which language grants the individual and his 'tribe'. Hierarchical Systems Theory (HST) thereby clarifies why the structure of 'speech acts' (Austin, 1962; Searle, 1975) has led to overemphasis of the importance of intentional states in understanding consciousness and the mind and to confusion as to the origin and underlying function of mental states. Indeed, HST makes sense of the fact that all category 2 animals demonstrate 'world to word', and 'word to world' 'direction of fit' in their communications, (Anscombe, 1957; Searle, 1983) but clarifies that the utterances and gestures of animals are related merely to feelings and needs, rather than to the richer potential of concepts and desires, in the case of humans.

It is also the case that natural selection has responded to the benefits of communicating conceptualised reality by evolving highly sophisticated physiological adaptations to *facilitate* and *enhance*, and thereby take advantage, of language capabilities.

Inevitably, one must reevaluate the conclusions of Savage-Rumbaugh et al. (1993) and Greenfield & Savage-Rumbaugh (1990, p. 540) that the "evolutionary root of human language" can be found in the "linguistic abilities of the great apes" and be critical of Leakey & Lewin (1992) who speculate that the cognitive foundation for human language is present in ape brains. Hierarchical Systems Theory falsifies the view that physiological characteristics are responsible for the emergence and development of language and offers the alternative that an evolving systems hierarchy drives the development of physiological evolution for each category. Indeed, the application of the systems hierarchy model to the research shows a clear unifying distinction and a coherent explanation: Category 2 consciousness processes compel apes and immature human infants to communicate only innate responses and emotionally motivated attitudes, whilst category 3 processes, additionally, compel mature humans to communicate conceptualised reality.

Why are phenomenal properties ineffable?

For an individual to be aware of the conscious state is to be aware of the phenomena of learning and feeling but *not* of the mechanisms behind learning and feeling. This provides the explanation to point 2.1.3 of Carruthers' requirements of an adequate reductive explanation of phenomenal experience; namely, why the properties distinctive of phenomenal consciousness can seem to their subjects to be ineffable or indescribable:

Higher-order thought (HOT) processes (Carruthers, 2000b notably section 7 on dispositionalist HOT; Pharoah, 2008; Rosenthal, 2002) generate a perspective that has no means of either accessing category 1 processes, which organise the structure of its complex biochemical mechanisms or category 2 processes, whose first-order representations (c.f. Dretske, 1995; Tye, 1995 for FOR theories) generate its sensations and feelings (Carruthers, 2000b).

This does little to deter individuals from *trying* to conceptualise the phenomenon of their experiences, which include bodily functions, sensations, emotions, and consciousness itself. In conclusion to such cogitations, an individual might come to define sensations as, for example, 'introspectively accessible phenomenal experiences that are irreducible' and yet this conceptual definition provides *no* clue as to what sensations *actually feel like* or what they are, exactly. Inevitably, despite the familiarity of phenomenal experience and consciousness, conceptual identification remains elusive. This is clearly demonstrated by the commentary on thought experiments like that of Nagel's "Bat" (1974) and Jackson's "Mary" (1986) (c.f. Dennett's 'The Unimagined Preposterousness of Zombies', 1995b).

The relationship between stable concepts of reality and social cohesion

One of the key characteristics of a system state is its tendency toward stability. This is not surprising: If the interdependent parts of a system cause instability, the continuing survival of the system state is jeopardised. A system state is defined by the component stability of its dynamic parts.

Equally, a category 3 system state seeks a stable concept of reality. When a concept does not conform to the reality of its learning and experiential evaluations, the stability of that system concept is compromised. And yet, an individual is compelled to reevaluate its concepts of reality in response to everyday experiences, contemplations, and during the communication of language.

Contemplation and discussion always challenge the stability of concepts about reality. Importantly, every individual's concept of reality includes the individual's stable interpretation of self. Consequently, there is the tendency for contemplation and discussion to *feel* like a challenge to the 'self-concept'. Inevitably, individuals are prone to be extremely protective of their perspective of reality and to be eager to maintain stable concepts however absurd they may be shown to be. Propositioning others with novel concepts and ideas is a challenge because existing and well-guarded concepts need first to be 'gently' dismantled or, more typically, incorporated.

The concepts of individuals incorporate family, tribal, and social beliefs and ideals. In these situations, concepts are not so much derived from the interpretation of experience, but from the unquestioning absorption of the feelings associated with culture, beliefs and ideals. Individuals are compelled to protect the ideals and the beliefs of their affiliated groups. Concepts derived from group affiliation are particularly potent. The reevaluation of an individual's concept of reality, can generate both positive and negative conclusions that fuel individual and societal creativity, bias, and prejudice.

Prejudice and creativity are symptomatic of the reinterpretation of realisations, and evoke the experiences and behaviours that are unique to human societies. Interestingly, under certain specific conditions, there may develop different classes of 'conceptual distortions' and divergence strategies to maintain conceptual stability. One could classify these distortions and their ensuing behaviours in terms of the relationship between concepts and the dynamics of affiliates category 1, 2 and 3 anomalies. This is a new science classification that requires study because it will lead to advances in psychological profiling and treatments, and to principles relating to group conflict and resolution.

Hierarchical Systems Theory is simple, unifying, and coherent

Hierarchical Systems Theory explains how ordered and disordered interaction between systems and their environments leads to an evolved hierarchy of systems structures. It also explains why these systems are self-regulatory. It is a simple and unified model that explains the dynamic that generates the phenomenon of experience, which humans identify as consciousness. It explains the systems hierarchy and mechanisms that coherently relate many characteristics such as replication, environmental information, phenomenal experience, and the phenomenon of conceptualised reality. In doing so, it satisfies Chalmers' principle of structural coherence (Criterion C), which requires that the processes that explain awareness link structurally to the basis of consciousness by determining the relationship between that of which we are aware (and can report upon) and that of which we experience.

Furthermore, Hierarchical Systems Theory demonstrates an example of a Dowell (2007b) type-C physicalist's reductive explanation of phenomenal experience by providing a structural link between that of which we are aware, which comprise of our conceptual representations, and that which we experience.

During the late Pliocene, about two and a half to three million years ago, the fourth evolutionary explosion began. The hominid category 2 brain may have initially developed in sophistication gradually because of the adaptive consequence of evolution and survival. But this incidental adaptation resulted in the emergence of category 3 mental processes. The benefits of conceptualising reality had a dramatic affect on cerebral expansion, physiological and neurological development, social dynamics, and the survival ethic of early hominids. The development of humankind and its unique identifying characteristics are the conclusion to the fourth evolutionary explosion where conceptual evolution rather than biological evolution has taken precedence.

But HST has even more to offer:

By extrapolation, one can ascertain the nature and mechanisms behind the next evolutionary stage - The future evolutionary stage to which humankind is heading.

What is that future state?

5.4 Systems Category 4.

Future States

A category 3 human that is actively aware of consciousness has a neural mechanism that enables it to modify its understandings in an ordered manner. This occurs when a systems structure is compelled to formulate conceptual relations regarding its environmental knowledge.

The key points from the previous category 3 section are that,

1. Systems that are aware of consciousness, construct concepts based on extrinsic relationships between known properties.
2. The underlying function of the category 3 awareness mechanism is to maintain stable concepts about reality.
3. Concepts do not have to be constructed using verbal language. A concept can be based on any relationship between comparable types of information.
4. One of the by-products of the mechanism is creativity.
5. The construction of a conceptual realisation is what compels a human to formulate any suitable grammatical framework that can effectively communicate conceptualised relations.

6. An individual's languages develop in response to its maturing concepts and their descriptive relevance.
7. An individual will defend its concept of reality with mental and physical vigour.
8. Concepts need not be derived solely from the interpretation of experience, but are necessarily derived from feelings relating to group cultures, beliefs and ideals.

Is human awareness of consciousness an end point in the evolution of mind?

According to Hierarchical Systems Theory, there is scope for the evolution of a future category 4 state. This is evident when one extrapolates from the underlying principles of HST. To do so, requires that one must consider what the defining features of the future state to which the human mind might evolve could be?

Notably, each category develops a specific and unique characteristic that is *not* controlled by the mechanics of the systems category. That the characteristic grants the system in each category some kind of advantage however, means that there is an evolutionary precedent. When a system then evolves such that its structure is capable of *controlling* the nature of that unique characteristic, that systems design acquires a new and powerful functional construct, a construct that can maximise the system's structural advantages. Unsurprisingly, that construct then becomes the formative dynamic in the evolution of entirely new physiological features and functional behaviours.

In order to determine what future category 4 will be therefore, one must look at the unique characteristics of category 3 humans, and ask the following questions:

1. What unique category 3 characteristic is being acquired in a manner that is not controlled by the mechanics of the systems category?
2. Has this characteristic evolved in complexity over generations and has it got the potential to form a systems construct that could lead to a 5th evolutionary explosion?
3. What will be the defining qualities of this future construct?
4. In what way will it influence humanity?

1. What unique category 3 characteristic is being acquired in a disordered manner?

The Hierarchical Systems Theory tells us that the next systems category will evolve out of the unique human category 3 system, and that this new category 4 will take the form of a once passive category 3 process and make it both active and fundamental to the structure of the new system. Therefore, in order to find out the possible features of the future category 4 construct, one needs to ask what specific 'class' of concepts about reality have been evolving *outside* of purposeful human control within the category 3 system?

For example, one might propose that creativity is a possible candidate. After all, creativity is a unique characteristic of category 3 humans. But creativity is not a concept so much as a category by-product. Its equivalent in category 2 is learning. But like learning, creativity cannot be the unique characteristic at the heart of the evolution of the future category 4.

One might suggest science. But science concerns itself with identifying applications of proof in the search for applicable definitions for objective reality. As such, there is no developmental construct to the discipline of science.

Should we look at an ethereal concept, like 'love'? It is true that love is a central theme to many religions. The problem with the candidate love is that it does not appear to be progressive. It is not an evolving concept. Indeed, it is a concept that has a tendency to seek to defy objectivity, to resist definition, and to hanker to the inexplicably primitive rather than to develop.

Morality is a conceptual construct that is in flux as it evolves under the auspices of religion, philosophical contemplation, and our individual sense of human value. The morality of our times is very different to that say found in the Old Testament or in the teachings of the ancient Greeks, or even across present day cultural boundaries and countries. Everyday, individuals deliberate their moral inclinations to instruct their responses to daily consideration. At the heart of morality is a sense that there is a profound aspirational wisdom that might help instruct all human deliberations and actions.

2. *Has morality the potential to form a systems construct that could lead to a 5th evolutionary explosion?*

Given that morality might be a potential candidate as a systems construct for category 4, what could possibly evolve accidentally from morality concepts that would lead to a unique active and ordered systems state? One can assume that certain individual humans have glimpsed this understanding, just as some category 2 apes might have had emerging revelations of concepts about reality. But like some apes, these human individuals have been unable to grasp the essence of the construct and to imbue human conscience with a stable construct from which all of humanity could actively partake. But the sense that some higher wisdom of morality might include all-embracing visions of a consuming tranquil love is indication that there might be further revelations to our moral understanding. Morality has evolved over millennia and it certainly has the capability of developing a profoundly powerful systems construct.

As a construct for future category 4, one would not recognise the concept of morality in the way humans currently understand and relate to it. Personally, I think of this new understanding and redefinition as a 'moral-wisdom' that binds with 'practical wisdom'. What is artistic, scientific, religious, and philosophical endeavour, if it is not about finding a path to wisdom? This is the driving force behind our creative urges. Humanity just has not realised this to be the case. As a category 3 construct, wisdom has been acquired passively because wisdom is a disordered consequence of our creative activities. As a category 4 imperative, this future humanity will actively seek a stable 'wisdom'.

3. What will be the defining qualities of this future construct?

The seeking of a stable wisdom will lead to the end to intolerance, to the justification of all proper action, to a founding classification of social cohesion, to an understanding of boundless endemic creativity, to the end of improper goals. It will lead to rapid access to the resolution of internal and social group conflict and to an understanding of how to evaluate progress and to determine what humanity wants from progress.

4. In what way will a category 4 state influence humanity?

A category 3 human that is actively aware of its conscious state has a cognitive mechanism that enables it to evaluate its behaviour through conceptual appraisal. Whilst assessing the intentions and effects of its behaviour, an individual develops concepts with which it can make definitive judgments. The communication of these considerations in a societal context leads to the development of values. Any particular family of values are based on separate but interacting sets of principles categorised, for example, in the morality of religion, law, ethics, and personal considerations of free will. These frequently are in conflict with one another creating conceptual and behavioural paradoxes. This indicates that the evolution of morality has been a disordered by-product of passive category 3 processes. It is an exciting prospect that this autopoietic process and consequential social attitudes and behaviours indicate that human moral conscience exists and evolves within the bounds of a unified construct that obeys fundamental dynamic systems principles. A category 4 state will, theoretically, involve the acquisition of an intentionally structured ethical discourse bound by a fundamental wisdom. This should lead, theoretically, to an explosion in human behavioural and physiological development.

References

Austin, J. L. (1962) *How to do things with words: The William James lectures,* Urmson, J. O. (ed.) Oxford: Clarendon Press.

Anscombe, E. (1957) *Intention*, Oxford: Blackwell.

Armstrong, D. (1968) *A Materialist Theory of the Mind,* London: Routledge.

Armstrong, D. (1984) Consciousness and causality, in Armstrong, D. & Malcolm, N. (eds.) *Consciousness and Causality,* (pp. 103-191), Oxford: Blackwell.

Barab, S., Cherkes-Julkowski, M., Swenson, R., Garrett, S., Shaw, R.E. & Young, M. (1999) Principles of self-organization: Learning as participation in autocatakinetic systems, *The Journal of Learning Sciences,* **8**, pp. 349-390. [Also online], http://sashabarab.com/research/onlinemanu/papers/selforg.pdf

Bennett, J. (1966) *Kant's Analytic,* Cambridge: Cambridge University Press.

Bennett, J.O., Shostak, S., & Jakosky, B. (2003) *Life in the Universe,* Boston, MA: Addison-Wesley.

Bertalanffy, L von. (1950) An Outline of General System Theory, *British Journal for the Philosophy of Science,* **1**, pp. 139-164. [Also online], http://www.isnature.org/events/2009/Summer/r/Bertalanffy1950-GST_Outline_SELECT.pdf

Bertalanffy, L von. (1951) General system theory - A new approach to unity of science (Symposium), *Human Biology,* **23**, pp. 303-361.
Boltzmann, L. (1974) The second law of thermodynamics, in McGinness, B. (ed.), *Theoretical Physics and Philosophical Problems* (pp. 13-32), NY: D. Reidel. (Original work published 1886).
Carruthers, P. (1996) *Language, Thought and Consciousness: an essay in philosophical psychology,* Cambridge: Cambridge University Press.
Carruthers, P. (2000a) *Phenomenal Consciousness,* Cambridge: Cambridge University Press.
Carruthers, P. (2000b) The evolution of consciousness, in Carruthers, P. & Chamberlain, A. (eds.), *Evolution and the Human Mind,* Cambridge: Cambridge University Press, [Also online], http://www.philosophy.umd.edu/Faculty/pcarruthers/Evolution-of-consciousness.htm [Jan 2012].
Carruthers, P. (2004) Reductive explanation and the 'explanatory gap', *Canadian Journal of Philosophy, **34***, [Also online], http://www.philosophy.umd.edu/Faculty/pcarruthers/Reductive-explanation.htm [24 Jan 2012].
Chalmers, D. (1994) *What is it like to be a thermostat?* [Online at], http://consc.net/notes/lloyd-comments.html
Chalmers, D. (1995) Facing up to the problem of consciousness, *Journal of Consciousness Studies* **2** (3). pp. 200-219, [Also online], http://consc.net/papers/facing.html [24 Jan 2012].
Chalmers, D. (1996) *The Conscious Mind,* Oxford: Oxford University Press.
Chalmers, D. (1999) Materialism and the metaphysics of modality, *Philosophy and Phenomenological Research*, **59**.
Chalmers, D. & Jackson, F. (2001) Conceptual analysis and reductive explanation, *The Philosophical Review*, **110**.
Chomsky, N. (1988) *Language and Problems of Knowledge: The Managua Lectures,* Cambridge, MA: MIT Press.
Complin, C. (1997) *The evolutionary engine and the mind machine: A design-based study of adaptive change,* Unpublished doctoral dissertation, University of Birmingham, UK, [Also online], http://www.cs.bham.ac.uk/research/projects/cogaff/0-INDEX96-99.html#27 [24 Jan 2012]
Coren, R. (2001) Empirical evidence for a law of information growth, *Entropy, **3***, pp. 259-272, [Also online], http://www.mdpi.org/entropy/papers/e3040259.pdf [24 Jan 2012]
Corning, P.A. & Kline, S.J. (1998) Thermodynamics, Information and Life Revisited, Part I: 'To Be or Entropy' *Systems Research and Behavioural Science,* **15**, pp. 273-295.
Damasio, A. (1994) *Descartes' Error,* NY: G.P. Putnam's Sons.
Damasio, A. (1999) *The Feeling of What Happens: Body and Emotion in the Making of Consciousness,* NY: Harcourt Brace.
Dennett, D. (1978) Towards a cognitive theory of consciousness, in Dennett, D. (ed.), *Brainstorms* (pp. 149-173), Hassocks: Harvester Press.
Dennett, D. (1991) *Consciousness Explained,* London: Penguin Press.
Dennett, D. (1995a) *Darwin's Dangerous Idea: Evolution and the Meanings of Life,* NY: Simon & Schuster.
Dennett, D. (1995b) The Unimagined Preposterousness of Zombies, *Journal of Consciousness Studies,* **2** (4), pp. 322–326.

de Sousa, R. (2003) Psychological and Evolutionary Approaches, *Emotion,* in Zalta, E. (ed.), *The Stanford Encyclopedia of Philosophy*, Stanford: Stanford University, [Also online], http://plato.stanford.edu/archives/spr2003/entries/emotion/#4 [24 Jan 2012].

Dowell, J.L. (2007a) Serious Metaphysics and the vindication of reductions, *Philosophical Studies* **139** (1) pp. 91-110.

Dowell, J.L. (2007b) A Priori Entailment and Conceptual Analysis: Making Room for Type-C Physicalism. Forthcoming in *Australasian Journal of Philosophy* **86** (1) pp. 93-111.

Dretske, F. (1995) *Naturalizing the Mind,* Cambridge, MA: MIT Press.

Flanagan, O. (1992) *Consciousness Reconsidered,* Cambridge, MA: MIT Press.

Gennaro, R. (1996) *Consciousness and Self-Consciousness,* Amsterdam: John Benjamins Publishing.

Greenfield, P.M. & Savage-Rumbaugh, E.S. (1990) Grammatical combination in Pan paniscus: Processes of learning and invention in the evolution and development of language, in Parker, S.T. & Gibson, K. (eds.), *"Language" and Intelligence in Monkeys and Apes: Comparative Developmental Perspectives* (pp. 540-579), NY: Cambridge University Press.

Gunther, Y.H. (2004) The phenomenology and intentionality of emotion, *Philosophical Studies,* **117** (1-2), pp. 43-55.

Hameroff, S. (1998) Did Consciousness Cause the Cambrian Evolutionary Explosion?, in Hameroff, S., Kaszniak, A., & Scott, A. (eds.), *Toward a Science of Consciousness II: The 1996 Tucson Discussions and Debates.* (pp.421-437), Cambridge, MA: MIT Press, [Also online], http://www.quantumconsciousness.org/penrose-hameroff/cambrian.html [24 Jan 2012]

Hinton, G.E., & Nowlan, S.J. (1987) How learning can guide evolution, *Complex Systems,* **1** (3), pp. 495-502. Also in Belew, R. K. & Mitchell, M. (eds.1996), *Adaptive Individuals in Evolving Populations: Models and Algorithms,* Santa Fe: Addison-Wesley. (pp. 447-454).

Jackson, F. (1982) *Epiphenomenal qualia,* Philosophical Quarterly, **32**.

Jackson, F. (1986) What Mary Didn't Know, *The Journal of Philosophy* **83** (5), pp. 291-95.

Jorgensen, S.E., & Svirezhev, Y.M. (2004) *Towards a Thermodynamic Theory for Ecological Systems,* San Diego: Elsevier.

Kant, I. (1922) *Critique of Pure Reason,* in Mueller, F, M. (trans.), New York: Macmillan (Original work published 1781/8), [Also online], http://oll.libertyfund.org/?option=com_staticxt&staticfile=show.php%3Ftitle=1442&chapter=97760&layout=html&Itemid=27

Kaszniak, A. (2001) *Emotions, Qualia, and Consciousness,* Singapore: World Scientific Publishing.

Kirk, R. (1994) *Raw Feeling,* Oxford: Clarendon Press.

Kuhn, A. (1974) *The Logic of Social Systems,* San Francisco: Jossey-Bass.

Leakey, R., & Lewin, R. (1992) *Origins Reconsidered: In Search of What Makes Us Human,* NY: Doubleday.

Levine, J. (1983) *Materialism and qualia: the explanatory gap,* Pacific Philosophical Quarterly, **64**.

Levine, J. (1993) On leaving out what it's like, in Davies, M and Humphreys, G (eds.), *Consciousness*, Oxford: Blackwell.

Levine, J. (2001) *Purple Haze: The puzzle of consciousness,* Oxford: Oxford University Press.

Loar, B. (1990) Phenomenal states, *Philosophical Perspectives,* **4**, pp. 81-108.

Lycan, W. (1987) *Consciousness.* Cambridge, MA: MIT Press.

Lycan, W. (1996) *Consciousness and Experience,* Cambridge, MA: MIT Press.

Maudlin, T. (1989) Computation and Consciousness, *Journal of Philosophy*, LXXXVI: 407–432. [Also online], http://www.finney.org/~hal/maudlin.pdf

Maynard Smith, J. (1987) When Learning Guides Evolution, *Nature* **329***,* 761-762. Also in Belew, R. K. & Mitchell, M. (eds.1996), Adaptive Individuals in Evolving Populations: Models and Algorithms, Santa Fe: Addison-Wesley. (pp. 455-457).

McGinn, C. (1991) *The Problem of Consciousness,* Oxford: Blackwell.

Nagel, T. (1974) What is it like to be a bat? *Philosophical Review* **83** (4), 435-50.

Nelkin, N. (1996) *Consciousness and the Origins of Thought,* Cambridge: Cambridge University Press.

Nielsen, L. (1998) Modeling creativity: Taking the evidence seriously, in Hameroff, S. R., Kaszniak, A. W. and Scott, A. C. (eds.), *Toward a Science of Consciousness II: The Second Tucson Discussions and Debates* (pp. 717-824), Cambridge, MA: MIT Press.

Pharoah, M.C., (2008) *Enhancing Dispositional Higher-Order Thought Theory*, [Online], http://homepage.ntlworld.com/m.pharoah/hs&dhot.html [24 Jan 2012]

Pieper, J. (2000) *Entropy, Disorder and Life,* [Online], http://www.talkorigins.org/faqs/thermo/entropy.html [24Jan 2012].

Prigogine, I. (1978) Time, Structure, and Fluctuations, *Science,* **201***,* pp. 777-785. [Also online], http://pchen.ccer.edu.cn/homepage/Time,%20Structure,%20and%20Fluctuations.pdf

Rosenthal, D. (1986) Two concepts of consciousness, *Philosophical Studies,* **49***,* pp. 329-359.

Rosenthal, D. (1993) Thinking that one thinks in Davies, M. & Humphreys, G. (eds.), *Consciousness* (pp. 197-223), Oxford: Blackwell.

Rosenthal, D. (2002) Consciousness and Higher-order Thought, in Nadel (ed.), *Encyclopedia of Cognitive Science,* (pp. 717-726), London: Macmillan, Nature Publishing Group.

Savage-Rumbaugh, E.S., Murphy, J., Sevcik, R.A., Brakke, K.E., Williams, S.L., & Rumbaugh, D.M. (1993) Language comprehension in ape and child, *Monographs of the Society for Research in Child Development,* **58** (3-4 Serial No. 233).

Schneider, E.D., & Kay, J. J. (1994) Life as a manifestation of the second law of thermodynamics, *Mathematical and Computer Modelling,* **19***,* pp. 25-48. [Also online], http://merkury.orconhosting.net.nz/lifeas.pdf

Schopf, J.W. (1999) *Cradle of Life: The Discovery of earth's Earliest Fossils,* Princeton: Princeton University Press.

Schrödinger, E. (1944) *What is Life?* Cambridge: Cambridge University Press, [Also online], http://whatislife.stanford.edu/LoCo_files/What-is-Life.pdf [24 Jan 2012]

Searle, J. R. (1975) A Taxonomy of Illocutionary Acts, in Günderson, K. (ed.), *Language, Mind, and Knowledge*, University of Minneapolis Press, vol. 7 pp. 344–369. [Also online], http://www.mcps.umn.edu/assets/pdf/7.8_Searle.pdf

Searle, J. (1980) *Minds, brains, and programs,* Behavioral and Brain Sciences, **3 (3),** pp. 417-457. [Also online] http://pami.uwaterloo.ca/tizhoosh/docs/Searle.pdf

Searle, J. (1983) *Intentionality: An Essay in the Philosophy of Mind*. New York: Cambridge University Press.

Sturgeon, S. (1994) *The epistemic view of subjectivity,* Journal of Philosophy, **91**.
Sturgeon, S. (2000) *Matters of Mind: Consciousness, Reason and nature,* London: Routledge.
Swenson, R. (1988) Emergence and the principle of maximum entropy production: Multi-level system theory, evolution, and non-equilibrium thermodynamics, *Proceedings of the 32nd Annual Meeting of the International Society for General Systems Research,* **32**.
Swenson, R. (1989) Emergent attractors and the law of maximum entropy production: Foundations to a theory of general evolution, *Systems Research,* **6***,* pp. 187-197.
Swenson, R. (1997) Autocatakinetics, evolution, and the law of maximum entropy production: A principled foundation toward the study of human ecology, *Advances in Human Ecology,* **6***,* pp. 1-46. [Also online], http://www.spontaneousorder.net/
Tye, M. (1995) *Ten Problems of Consciousness: a representational theory of the phenomenal mind,* Cambridge, MA: MIT Press.
Tye, M. (2000a) *Language, Thought and Consciousness: an essay in philosophical psychology,* Cambridge: Cambridge University Press.
Tye, M. (2000b) *Color, Content, and Consciousness,* Cambridge, MA: MIT Press.
Velmans, M. (2001) A natural account of phenomenal consciousness. *Communication and Cognition* **34**, (1/2) pp. 39-60, [Also online], http://www.neuroquantology.com/index.php/journal/article/view/70/70 [24 Jan 2012]
Woodruff Smith, D. (2001) Three facets of consciousness, *Axiomathes* **12***,* pp. 55-85.