On the Origins of Life, Consciousness, and Personal Identity
A Reductive Exploration of Life, Consciousness, and Personal Identity

ABSTRACT: *This article provides a reductive explanation of 'phenomenal experience', demonstrating compliance with exhaustive philosophical criteria. It does this by describing and explaining the relationship between a hierarchy of complex systems constructs. In doing so, it closely relates the development of emergent mind states to the evolution of biological structure and behaviour. The article focuses on those aspects of the reductive explanation that provide insight into unique human characteristics, specifically in relation to social behaviours, emotion, the philosophy of language, and creativity. Finally, the paper indicates that this reductive explanation is a necessary and vital component in artificial consciousness applications.*

Overview

Consider the following:

Light striking the eye's retina differs from when it strikes other surfaces. Instead of the light energy merely interacting with the surface through absorption and reflection, the specialised and ordered structure of the retinal nerve translates the light impulse into a neural format. Following this conversion, the 'light energy' travels throughout the neural network and may be filtered, eliminated, conjoined with other impulses, or expressed through motor activity etc. With multiple neural mechanisms, the human brain transforms environmental stimulations into neural constructs.

The brain is a high level example of an evolved structure that dissipates various forms of energy in an 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 do this too. Importantly, these lower levels have a relational status with the higher levels. It is through the identification and explanation of this dynamic relationship between lower and higher levels that this paper is able to provide a reductive explanation of phenomenal experience.

There are three objectives to this paper:

a) Firstly, to introduce and outline a dynamic systems model that I call the 'Hierarchical Systems Theory', which provides a reductive explanation of phenomenal experience and an explanation of the evolutionary foundations behind consciousness;
b) Secondly, to show how this theory relates to the evolutionary development of biological structure and behaviour; and
b) Finally, to indicate how a reductive explanation of phenomenal experience offers explanations for some of the defining and most puzzling characteristics of human behaviour.

To begin, there is an appraisal of the philosophy that indicates what requirements are necessary of a coherent reductive explanation of phenomenal experience (section 1). Then there is a brief historical perspective to the science that seeks to explain complex organic systems (section 2). Finally, 'Hierarchical Systems Theory' (HST) is described in detail (sections 3 and 4).

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

1.1 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 experience (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). Chalmers (1995) speculates in favour of an explanation that is non-reductive and that requires the discovery of, an as yet, undiscovered psycho-physical entity or fundamental force with its own laws. Alternatively, others argue in favour of a reductive explanation, with claims by several to having already provided one (Carruthers, 2000a; Dennett, 1991; Dretske 1995; Lycan 1996; Tye, 2000).

What then, are the considered requirements of an adequate explanation of phenomenal experience?

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

> i) explain how phenomenally conscious states have a subjective dimension; how they have feel; why there is something which it is like to undergo them;
> ii) why the properties involved in phenomenal consciousness should seem to their subjects to be intrinsic and non-relationally individuated;
> iii) why the properties distinctive of phenomenal consciousness can seem to their subjects to be ineffable or indescribable;
> iv) why those properties can seem in some way private to their possessors; and
> v) how it can seem to subjects that we have infallible knowledge of phenomenally conscious properties.

b) 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:

i) 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).
ii) 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).
iii) 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 'Hierarchical Systems Theory', Chalmers (1995) 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.

c) 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.

1.2 Hierarchical Systems Theory at a glance

Whilst Hierarchical Systems Theory's (HST) reduction describes the processes that lead to the emergence of phenomenal experience, there is an argument suggesting that it does not explain first-person individuated consciousnesses or indicate which of the dualists or materialists views of consciousness are valid.

In answer to this objection, Hierarchical Systems Theory explains how the phenomenal experience of the first person must exist and explains why and how it evolved, but it does not explain the 'actual' perspective that defines any single individual. In this regard, HST provides an explanation for phenomenal experience without settling any views as to the dual or material nature of 'consciousness' itself. In its reductive explanation therefore, HST unequivocally divides the problem of consciousness into two parts:

i) The phenomenal part, which is reductively explained in this paper; and out of necessity
ii) A noumenal part, which is not discussed further in this paper (for this discussion, cf. Pharoah 2008)

In providing a reductive explanation of phenomenal experience, HST determines that,

i) the phenomenon of consciousness is an evolving emergent status;
ii) the hard problem of consciousness is not the problem of experience;
iii) a full account of consciousness requires a theory that also explains the noumenon of consciousness; and
iv) the materialist, monist, and dualist equally can make claim to HST - The claimants views will differ with regard their understanding of how the noumenal relates to the phenomenal; but
v) HST provides no insight into the relationship between phenomenal experience and cognitive science.

In summary, this reduction provides uniform consistency by showing an evolving systems-hierarchy that extrapolates from physics principles 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 theories in that it formalises a dynamic hierarchical structure that explains physiological and evolutionary relationships. This answers questions posed by Carruthers (2000b) as to how and why transitions in the evolution of consciousness take place. Furthermore, it indicates opportunities for empirical testing.

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

2.1 The science of thermodynamics and the problem of order from chaos

Schrödinger (1944) makes the observation that the laws of physics "have a lot to do with the natural tendency of things to go over into disorder" and that "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. However, 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.

2.2 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 in introducing his General Systems Theory via the British Journal for the Philosophy of Science (1950) and the journal, Human Biology (1951). From these seminal papers are two points of particular relevance to this paper:

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

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.

Hierarchical Systems Theory develops the thoughts of Kuhn further, explaining how system stability arises through the transaction of information both by controlled and uncontrolled means and how this transaction is self-regulatory. Additionally, it describes a hierarchy of systems constructs each with their own unique systems behaviours.

3. Introducing Hierarchical Systems Theory

3.1 What is a system?

A system is an open state that is composed of interacting and interdependent parts whose combined dynamic relationships determine stable and coherent functional behaviours. Any given system exists by virtue of its component dynamic stability.

3.2 Systems stability and interaction

Interaction with the environment can disrupt system stability directly, or the stability of some of its interdependent parts. This disruption leads to a realignment of stability with one of two distinct possible outcomes (cf. figure 1):

> i) Disordered reaction - When the realignment of stability is not consistent with a system's structural function, reaction is disordered and the system passively acquiesces to a new reactive equilibrium.
> ii) Ordered reaction - Alternatively, when the realignment of stability is consistent with a system's structural function, reaction is ordered because the system actively dictates the restabilising reactive outcome. (More on these points later).

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

i) Systems behaviours, be they ordered or disordered as of points i) and ii) above, arise from dynamic reactive structural re-evaluations. These re-evaluations always result in an equilibrium, which may consist of a stable systems state.
ii) Systems behaviours are indicative of the displacement or conversion of energy from one state to another. When the conversion of energy is ordered as of point ii) above, that process is instructive because the system becomes more informed by the interactive process. Therefore, one can define such energy conversion specifically as, the 'movement of information'. When the conversion of energy is disordered as of point i) above, that process does not constitute the movement of information. If information describes some form of coherence between a system and its environment, then HST explains an evolving system-to-environment 'information' relationship hierarchy.

3.2.1 On the evolution of 'standard' systems structures

In the case of a standard systems construct, when a systems structure does not maintain its systems function during environmental interaction, the disordered reactive outcome can lead to uncontrolled structural alterations through the forced reacquisition of systems stability. When this happens, there is always the *potential* for new structural alterations to possess greater environmental resilience than their predecessor. This potential ensures that over many cycles of environmental interaction, standard systems 'accidentally' evolve, leading to increasingly complex structures with increasingly complex functional characteristics.

3.2.2 On the evolution of hierarchical systems constructs

A hierarchical system can arise if, during the evolutionary cycle of a standard systems construct, a unique systems construct coincidentally evolves with novel evolutionary properties. These novel evolutionary properties will have the capability of *controlling* the evolution of certain structural and functional characteristics, where they were previously *uncontrolled* in the standard system. The emergence of this 'intentionality' creates a new systems construct category, with its own unique dynamic adaptive potential. Any new adaptive forms then behave just like standard systems, but with their own unique subset of ordered and disordered behaviours, and their own unique evolutionary paradigm.

3.2.3 The specific example of the hierarchical systems constructs that explain the phenomenon of experience that humans call consciousness

The main focus now is to analyse an actual example of a hierarchical system. The three main objectives of this analysis are to,

i) Give a clearer indication of what a hierarchical systems dynamic entails;

ii) Demonstrate the underlying unity of the Hierarchical Systems Theory and indicate how this unity explains great complexity; and
iii) Provide a coherent reductive explanation of phenomenal experience by satisfying the necessary philosophical criteria stipulated in section 1 above.

4. Extrapolation of Hierarchical Systems constructs 1 to 3

4.1 Systems construct category 1

4.1.1 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*. But when speaking of systems structures, of which an atomic compound is an example, one must first consider that they *interact*. To say that a system and its environment interact, rather than react, is to acknowledge that there is a two way process where some form of energy exchange takes place. 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.

This is an unconventional definition of perception because it applies equally to inanimate systems structures as it does to 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 and becoming informed by experience.

This is a standard systems dynamic, where an atomic compound may follow either path of ordered functional systems behaviours or dysfunctional or unintentional chemical evolution.

4.1.2 The distinction between passive and active perception states

Passive perception - When a system, such as an atomic compound, interacts with its environment it might maintain its structural form by reacting in a manner that is consistent with its systems function or it might react in a disordered manner. When disordered, the resultant reaction may permanently compromise the system's structure and lead to systems dysfunction or lead to uncontrolled structural alteration. These structural alterations may include new compounds that have greater survival resilience. This possibility ensures the evolution of increasingly complex compounds as an accidental consequence of 'disordered' environmental interaction.

This disordered evolutionary process is indicative of an environmental perception that is passive because the perception happens unintentionally or fortuitously. However, there is a unique systems construct that is actively perceptive. This capability first arises by accident as a consequence of the evolution of increasingly complex compounds:

Active perception: A new systems construct - Unlike other systems structures that merely react, there is a systems structure that uniquely, actively dictates its structure's reactive capability, even under the duress of chaotic and disordered environmental interactions. Examples of such system types include ribonucleic acid and deoxyribonucleic acid, which belong to the polynucleotide family:

The ability to replicate affords its systems structure a unique characteristic and status because replication controls the reactionary development of the systems structure during environmental interaction *through successive generations*, even after the parent structure dissipates and ceases to exist.

A replicating system encapsulates its perceptions *actively* by controlling the progressive evolution of its representative 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 systems structural construct, transcending any individual structure's lifespan, through its successive generations. A replicating system is structurally *adaptive*, whilst non-replicating systems are merely *reactive*.

4.1.3 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, the interaction of a replicating system represents a new stable adaptation of that particular system as it evolves over generations.

4.2 Systems construct category 2

4.2.1 Consciousness states

In the following section, an examination of the unique characteristics of systems construct category 2 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 (cf. 1.1.a) i) and iii) above), specifically regarding the subjective dimension of "phenomenal states" and their ineffable nature, secondly with Chalmers' criterion A double aspect theory of information principle (cf. 1.1.b) i)), 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 (cf. 1.1.b) ii)), which states that any two systems with the same functional organisation will have qualitatively identical experience:

4.2.2 The concept of information as it relates to complex organic structures

The unique replicative characteristic of *actively* perceptive category 1 systems generates a potential survival advantage. The advantage, is that replicating systems can *adapt*, whilst non-replicating systems merely *react.* The advantage is a potential, because adaptation can be realised only through physiological evolution. The realisation of that potential is what leads to the evolution of increasingly complex replicating structural adaptations.

Consider the following statement:

A complex organic system's structure is the physiological embodiment of its 'knowledge of the environment'.

Clearly, in the context of this statement, knowledge is not of the kind that one might typically associate with such things as reasoning or thinking. Rather, it is by virtue of the complex structures and behaviours *themselves*, that organic systems structures demonstrate that they possess a certain knowledge 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. That organic systems have a physiologically encoded knowledge can be expressed alternatively, by saying that systems structures are a form, or type, of information construct (cf. information definition 3.2.ii)).

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,

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

This definition is emphatically not a call to panpsychism: An incorrect inference from this initial definition of consciousness might be that any structured series of biochemical processes, for example, chemical pumps, feedback mechanisms, inhibitors, and receptors, could be regarded as 'conscious' because they encode knowledge 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. To clarify the definition,

A systems structure is passively conscious when its component parts are the intrinsic interdependent elements that define the 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 do possess consciousness, and systems and structures that do not. For example, those that do not possess consciousness include,

> i) Manmade allopoietic structures, of which thermostats (Chalmers, 1994), buckets of water (Searle, 1983), or current computerised applications are examples.
> ii) Conglomerations of atomic elements and/or compounds, of which crystals or rocks are examples.
> iii) Systems that cannot replicate and consequently cannot behaviourally adapt, of which solar, economic, or social systems would be 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 may be interpreted as constituting a single interactive structure - When the person is in the house, that individual's environmental parameters are controlled and restricted by the house. However, combining the two does not constitute a uniform systems structure because they are not interdependent parts of a functional whole. 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) makes a related point with his 'Chinese Room Argument' thought experiment, where he argues that a computers syntactic operations do not lead to semantic interpretations on the part of the computer.

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 and narrow 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. 1.1.b) i) above - Criterion A). The second part of Chalmers' double aspect theory of information principle 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 and which broadens and clarifies the previous definition of consciousness:

4.2.3 Information growth 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 structural function, or the system's dynamic will reacquire stability in a disordered manner whereby the system's structure and integrity is compromised. One can explore this dichotomy in relation consciousness as follows:

Passive state - Mutation ensures that a replicating system's physiology adapts to the environment over time because it creates the potential of improved survival resilience (as of category 1, above). However, it is not its replicating structure but environmental selection, that determines the nature of the knowledge that a systems structure *acquires* over generations. A replicating organic structure does not have the capability to dictate the means by which it acquires complex environmental knowledge. 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 is passive for a replicating organism, because its structures acquire knowledge unintentionally over evolving generations.

This disordered evolution of the passively conscious, leads to ever increasingly complex structural adaptations, in perpetuity. However, this uncontrolled acquisition of 'innate' structural knowledge leads accidentally, to the creation of a new systems construct where consciousness becomes an active process:

Active conscious: A new systems construct - A system acquires a unique capability to actively and intentionally influence the acquisition of its knowledge when it develops the capability to *spontaneously* and *instantly* evaluate local environmental conditions. This capability has significant potential advantages over other forms of physiologically evolved knowledge because it enables the evolution of *behavioural* rather than mere *structural* adaptation. The potential advantages have resulted in the evolution of neural network mechanisms, which are the most successfully evolved biochemical mechanism capable of spontaneously encoding knowledge about environmental conditions.

4.2.4 On the evolving capability to 'evaluate environmental conditions'

To realise the potential advantages of behavioural adaptability requires category 1 structural adaptation through the evolution of,

i) Sensory mechanisms for converting environmental experience into a bio-chemical format.
ii) Interpretative mechanisms for conflating and organising that sensory derived information.
iii) Evaluative mechanisms for prioritising the relevancy of that knowledge for the purposes of motivating action.
iv) Physiological mechanisms for instituting the benefits of these cognitive capabilities.

The extent to which sensory, interpretative, and evaluative mechanisms evolve, determines the sophistication of an organism's behavioural adaptability and determines its ability to respond effectively to the 'good' and the 'bad' of environmental experience, whilst the potential benefits of these capabilities enables the evolution of advanced and spontaneously adaptable social interactions (cf. 4.2.8 on communication below).

4.2.5 On the 'good' and the 'bad' of environmental experience

Neurally encoded knowledge has a distinctive characteristic that sets it apart from structurally evolved knowledge. Specifically, actively conscious systems uniquely develop an *understanding* of knowledge. The understanding is defined by the relationship between a spontaneously acquired environmental knowledge and an interpretation of the *quality* or *value* of that experience. Some experiences are good whilst others are bad for particular systems structures.

It is through an association between its fluctuating stable neural knowledge and the aesthetic quality or value of its experiences, that an individual organism acquires a *stable understanding* of the environment. As the stability of understanding fluctuates with experience, an animal is compelled to 'learn' to balance its evolved aesthetic preferences.

4.2.6 HST explains the requirement for a stable understanding

A key characteristic of any systems structure is that its dynamic and interdependent parts must be able to maintain stability for the systems structure to exist (c.f. 3.1). Applying this principle to category 2; neurally encoded understanding about the environment, represents a singular stable systems state. Environmental conditions have a continually destabilising effect on neurally encoded understanding. Thus, there is a constant realignment of the stability of the understanding that neural structures encode in response to environmental interaction. As a consequence of this dynamic process, actively conscious systems are continually seeking an all-inclusive behavioural adaptation.

4.2.7 HST and the subjective and ineffable characteristic of the phenomenon of feeling

A continual realignment of stable understandings ensures that actively conscious organisms experience a unique phenomenon that reflects the essence of experience. This essence of changing knowledge as it relates to the aesthetic 'quality' of experience, creates a qualitative feeling phenomenon.

The term 'phenomenon of feeling', 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 representations. In itself, the effect arises as a by-product of the processes of active consciousness and has no contextual or relative status. Consequently, comparative experiential interpretation is not a process of 'thinking' that can therefore be self-scrutinised with thought. The aesthetic value of experience is determined by the innate intrinsic worth to a system of specific classes of experience. Consequently, qualitative feeling is subjective and ineffable. (c.f. Carruthers, 1.1.a) i) to v), and the second part of Chalmers criterion A (c.f. 1.1.b) i) above).

4.2.8 What HST indicates of 'feeling' and its correct interpretation

A stable understanding of experience does 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 or by communicating expressions that reflect its feelings regarding experience:

The evolution of the communication of feeling has an advantage in that it can lead to increasingly complex interactive social behaviours and distinctive individual and social stances. 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, the 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 a *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 and uniquely human attributes that alter human interpretations of the status of feeling. 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 feelings themselves.

4.2.9 HST and its impact on artificial consciousness applications

HST indicates that the desire for systems stability generates a self-regulatory macro-intentionality that drives the functional syntactic operations of actively conscious systems and is the motivation behind the evolution of physiological and organisational mechanisms. Theoretically therefore, a hierarchically based model founded on the principles established by HST would create the necessary causal mechanisms that would create a self-perpetuating artificial state whose functional organisation would generate syntactic mechanisms with qualitatively identical experiences to conscious animals. (cf. Searle, 1980 - The requirements of successful artificial intelligence applications).

4.3 Systems construct category 3

4.3.1 Awareness states

In the following section, the focus is on extrapolating the systems hierarchy further thereby providing a coherent explanation for unique human characteristics, such as language, complex social order, and creativity.

4.3.2 On the evolution of passive and active awareness

Passively aware state - In the previous category 2 section, active consciousness enables the intentional acquisition of knowledge and to the evolution of understanding and behavioural adaptation. This capability has unique potential survival benefits that drive the evolution of sensory, evaluative, and interpretative cognitive mechanisms. Inevitably, cognitive mechanisms evolve in perpetuity, and become increasingly sophisticated in their ability to respond to social and environmental influences.

During the process of re-stabilising understandings, any insights a category 2 conscious individual may acquire are unintentional, because there is no systematic interpretation of understanding and no conception of what understandings mean in the context of reality. Such individual animals are *passively* aware of the conscious phenomenon of experience. Kant describes what it is like to experience this passive state 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)

However, with ever-increasing cognitive complexity there comes a point in the evolution of animals that are passively aware of the conscious phenomenon of experience, when a unique systems construct emerges.

Actively aware state: A new systems construct - The neural mechanism responsible for creating understanding evolves a unique systems construct when it begins to generate 'interpretations of understanding'. Interpretations of understanding require the identification of relationships regarding the principle and conditional properties of the objective elements that comprise the reality that an individual experiences. When a system begins to interpret understanding in this way, it has the capability of developing 'conceptual realisations'.

In category 2, learning and feeling are a derivative of complex processes and experiential associations. However, this complexity does not bestow upon its actively conscious individuals a realisation as to the significance of these associations. To do so, would be to recognise their *functional* relevance. For example, an animal may learn that prodding a stick into a crack in a tree and wiggling it about reveals a grub that satisfies its hunger. However, this does not indicate the possession of a conceptual realisation 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 about how they might satisfy.

The proposal is that a complex interdependent conceptual architecture evolves from a realisation of objective functional properties in view of the emergent appreciation and interpretation of an individual's desires, feelings and understandings.

4.3.3 On the emergence of two fundamental concepts

a) As concepts emerge, they do so in correlation with environmental properties, which are also formative in the evolution of the distinctive processing and structural characteristics of each systems category, 1 to 3. An example of two such properties are the spatial and temporal. Whilst a non-human animal is capable of relating to the contents of objective reality contextually in terms of their position in time and space, it is unable to represent those same objects within a spatiotemporal conceptual architecture.

A spatiotemporal conceptual architecture has profound implications on the way an individual relates to reality. This relationship need not be generated within the confines of verbal language but can be based on any 'principle of relations'. For example, the principle of relations between the sound pitches in time and the pitch intervals of space, enable humans to conceptually interpret melody and harmony in music and then to relate this to the phenomenon of music's experiential effects as a moving landscape of emotive impressions; all without necessarily interpreting the same through a verbal description.

As with all concepts, spatiotemporal concepts are founded on a 'principle of relations' that determine an emergent correlative interpretation of the extrinsic properties that comprise reality, but inevitably can never decipher the intrinsic nature of those properties in themselves.

b) Another powerful concept, is the recognition of the phenomenon of reality itself. I say that it is powerful, because it is by recognising the phenomenon of reality that an individual human comes to recognise itself as a being that exists, as part of reality. 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 architecture generates concepts about phenomena and ultimately to the recognition of phenomenal experience as a 'condition' of the self. Once again this is consistent with Kant (1781/1922):

> ...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)

Notably, it is impossible for a self-concept to exist without a belief-concept that can account for the subjective, even if that concept maintains the *denial* of the subjective.

4.3.4 Languages are a by-product

Being actively aware of the conscious state has a significant effect on communication. Whilst the communication of only feeling in category 2 conscious animals may exploit 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 conceptualised reality. That universally suitable framework for all languages, is a grammar that facilitates the identification and relation between the objects and functions relevant to the conceived reality worldview. Consequently, an individual's languages develop *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 functional mechanisms are merely a *by-product* of the dynamics arising from being actively aware of consciousness. Language *arises* in individuals from the compulsion to persuasively communicate their 'revelatory' conceptual realisations.

Hierarchical Systems Theory qualifies the need for a reevaluation of 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 of the speculations of Leakey & Lewin (1992); that the cognitive foundation for human language is present in ape brains. HST falsifies the theory that physiological characteristics are responsible for the emergence and development of language, offering the alternative view that an evolving systems hierarchy drives the development of physiological evolution in each category. Reviewing the research in the light of HST shows a unified and coherent explanation: Category 2 consciousness processes compel apes and immature human infants to communicate only innate responses and attitudes of feeling, whilst category 3 processes, additionally, compel maturing humans to communicate conceptualised reality. The potential benefits of sophisticated social interaction that arise from the expression of conceptualised reality are what drive cognitive and physiological adaptations that expedite the identification of principles of objective function, the manipulation of social and environmental causes, and *facilitate* the development of language processing mechanisms.

4.3.5 Why are phenomenal properties ineffable?

Conceptual processing has no greater capability for accessing category 2 processes, which generate sensations and feelings, than it has of accessing category 1 systems processes, which generate bio-chemical structure. This fact does little to deter individuals from *trying* to conceptualise the phenomenon of their experiences, which include bodily functions, sensations, feelings, 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 provide *no* clue as to what sensations *actually feel like* or what they are. The powers of conceptual thought are impotent in their scope to decipher the causal mechanisms of these processes through introspective analysis alone. Inevitably, despite the familiarity of phenomenal experience and consciousness, conceptual description remains elusive (Nagel, 1974; Jackson, 1986, Dennett, 1995b).

4.3.6 The relationship between stable concepts of reality, creativity, and social cohesion

One of the key characteristics of a system state is its tendency toward stability. This self-regulatory feature 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:

a) Every individual human possesses concepts of reality that are challenged by environmental interaction, contemplation, and discussion. Individuals are eager to resist their destabilising effect. Indeed, every individual’s 'concept of reality' includes a concept of self (c.f 4.3.3 b)), whose interdependent parts include a multitude of incorporated constructs. Consequently, individuals are extremely protective of their interdependent concepts because they contribute to a stable concept of self. Even when reason shows various concepts to be absurd, individuals will adamantly protect an irrational concept. This need for a stable concept of reality is the most potent influence in small group discussion, the marketing of novel concepts, and during attempts at creative contemplation.

b) An individual's concepts necessarily incorporate family, tribal, and social rules, beliefs, and ideals. These incorporated concepts are not so much derived from the interpretation of understanding, but from the unquestioning subscription to groups, for a variety of reasons; in business, in sport, in beliefs, in socialising, in being a citizen etc. Individuals are compelled to protect the ideals and the beliefs of their affiliated groups because they are formative in the development of their own conceptual architecture. Concepts derived from group affiliation are particularly potent, motivating great prejudice and bias. Notably, an individual's concepts are often conflicting with those group concepts to which he/she subscribes. Moralising is often preoccupied with these types of conflict in the actioning of behaviour, but this is a very narrow consideration to the cause of what is 'good' (author, year: [reference removed for blind peer review]).

c) Different classes and levels of 'conceptual distortions' and divergence strategies inevitably evolve in all individuals to maintain conceptual stability. One could classify these distortions and their ensuing behaviours in terms of the relationship between concepts and the dynamics of category 1, 2 and 3 anomalies. Understanding the nature of the development of these anomalies is necessary to further advance psychological profiling and treatments, and to improve techniques at resolving group conflict.

Summary

Hierarchical Systems Theory explains how ordered and disordered interaction between systems and their environments leads to an evolving hierarchy of self-regulatory systems constructs. Each construct has its own evolutionary paradigm and characteristic functional behaviours. It is a simple and unified model that explains the dynamic that generates the phenomenon of experience, which humans call consciousness:

Category 1 - The unintended emergence of active perception began on earth with complex replicating compounds about 3.5 to 4 billion years ago at the commencement of the pre-Cambrian period. It signifies a point when systems began to intentionally (rather than to unintentionally) evolve informed structural knowledge about the environment, with the potential benefits being realised in a disordered manner through the development of complex organic physiologies. A process of self-regulatory organisation is identifiable in these systems as they seek to maintain stable structural adaptations. The communicative behaviours of actively perceptive systems are confined to innate behavioural responses to environmental experience.

Category 2 - From the disordered evolution of category 1 structures emerged a systems construct that was actively conscious of experience. It began with the unintended evolution of the ability to spontaneously compare environmental experience in wormlike animals of the phylum Annelida about 540 million years ago fuelling the Cambrian evolutionary explosion. It signifies a point when systems began to intentionally evolve structural understandings by way of the informative relationship that exists between knowledge about the environment and its experiential effects. The potential benefits were realised in a disordered manner through the development of complex adaptive behaviours within the bounds of evolved complex cognitive and structural mechanisms. A process of self-regulatory organisation is identifiable in these systems as they seek to maintain stable behavioural adaptations. As by-products of the process, animals experience a phenomenon of feeling, and learn through its association with knowledge. The communicative behaviours of actively conscious systems are confined to verbal utterances and visual displays that portray only feeling.

Category 3 - From the disordered evolution of mechanisms that could enhance understanding in category 2 animals, emerged a systems construct that was actively aware of the conscious phenomenon of experience. It began with the unintended evolution of higher order conceptual processing in the hominid brain during the late Pliocene, about 2.5 to 3 million years ago. It signifies a point when systems began to intentionally evolve structural concepts about reality, which involves identifying the information architecture of the principles and conditional properties for the objective elements that comprise reality. The potential benefits were realised in a disordered manner through the development of complex creative behaviours (both negative and positive) within the constraints of evolving complex cognitive and structural mechanisms, fuelling a rapid expansion in brain size. A process of self-regulatory organisation is identifiable in these individual systems as they seek to maintain a stable concept of reality. As a by-product of the process, humans experience novel insights as they develop a complex conceptual architecture from a realisation of objective properties and functions. The communicative behaviours of actively aware systems are driven by a desire to convey realisations about reality using any suitable medium and framework. This is possible through a grammatical structure that need not be linguistic, but that must be able to convey conceptions of reality.

Category 4 **-** Finally, by extrapolation, one can ascertain the nature and mechanisms behind the next evolutionary stage - The future evolutionary stage to which humankind is evolving.

What is that future state?

References

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.

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

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.

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.

Hempel, C. (1965) *Aspects of Scientific Explanation and Other Essays in the Philosophy of Science*, New York: Free Press.

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.

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

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.

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

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

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. (

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.

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).

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. (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.

Tye, M. (1995) *Ten Problems of Consciousness: a representational theory of the phenomenal mind,* Cambridge, MA: MIT Press.

Tye, M. (2000) *Language, Thought and Consciousness: an essay in philosophical psychology,* Cambridge: Cambridge University 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]