Article

How Brain Makes Mind: The Principles of Operation (Part I)

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Abstract

We present the principles of operation by which a brain makes a mind, at all scales necessary to cover the whole problem. We inventory the necessary capabilities for a mind. We divide conscious mind into four layers of increasing elaboration. For the principles of operations of the lower two layers, we provide the STFC theory. For the upper two, we provide the STHC theory. We survey the evolutionary progression from first twinge of experience to human capacities. We explain the types of memory and problem-solving we carry and by what structures they are made to happen. We compare to prior works and review the philosophical implications and stance. All of this is done with minimal incoming assumptions, and those made are declared.

Part I of this four-part article includes: 1. Introduction; 2. All the Elements of Mind; 3. A Multiscale Problem; 4. Definitions; 5. Important Assumptions; 6. Levels of Consciousness; 7. The Four-Layer Architecture: The Gross Architecture of Consciousness; 8. Consciousness Architecture Layer 1: Fundamental Consciousness; 9. Sites of Fundamental Consciousness in the Brain; 10. The Nature of Sentience; and 11. Consciousness Architecture Layer 2: Sentience.

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1. Introduction

This paper comprises a Concept of Operations and Architecture Description Document for a mindful brain, plus rationale and process notes on their derivations.

The term “consciousness” has been used to address everything from the smallest fundamental capacities enabling sentience to the internal world of a human mind. In this paper, we address all of it.

We refer to an Architecture with which a mind is built. It is a layered architecture, cognizant of the building process of evolution.

The architecture we populate with theory. The theories are expected to see more revision over time than the architecture.

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By the time we get up to vertebrate brains (appearing in Layer 3) we start to have a great deal of extant data on how lower mechanisms are exploited and can use it here.

The paper's scope is of natural brains rather than artificial ones, though it is relevant to the latter. The most elementary facts of brain anatomy and operations we don't belabor and are widely available (Kandel, 2021).

2. All the Elements of Mind

This is the complete list of ingredients for mind:

Reflex (underpinning mind)

Regulation

Sensation

Memory, of half a dozen different types, enabling Learning

Feeling

Prioritization

Attention, bottom-up and top-down

Perception, Recognition

Prediction

Action Planning

Imagination

Decision-Making

Problem-Solving

Coordination

Unity

Making sense

Differentiating the real from the recalled or the imagined

Self

Symbol manipulation

Language

A theory that describes how all of these things work is a complete theory of mind.

3. A Multiscale Problem

The biggest issue of the consciousness mystery is not self-reference and certainly not cognition, but the existence of feeling. This topic has been rightly called the Hard Problem (Chalmers, Facing up to the problem of consciousness, 1995).

There is the matter of why and how we can feel at all, what is "subjective experience." And there is why given the useful valuation that the feeling phenomenon provides, we should also actually feel.

The answer to the Whys appears to be that any value mechanism would do, and real pain and pleasure are usable natural phenomena that are here in this universe for evolution to employ.

There is also the What and the How. What is feeling, scientifically? We address that.

The next puzzle is as to how minds are woven from basic mechanisms. While our knowledge is not complete, much of this puzzle is easier.

Multiscale models (what Rolls (Rolls, 2016) calls "levels of explanation") of less complicated systems have been employed for decades. To understand the whole of consciousness (or even just some important parts) it is necessary to examine it at multiple scales.

4. Definitions

Feeling: Experience. That which makes the Hard Problem (Chalmers, Facing up to the problem of consciousness, 1995).

Raw feeling: The concept of basal, indivisible feeling.

Qualia: The allegedly rawest feelings discernible to a mind, discovered through introspection.

Consciousness: Feeling and, typically, information processing affecting each other in organized fashion to make action decisions in the interests of a species.

Levels of Consciousness: A progression of Fundamental Consciousness, Sentience, Animal Consciousness, Human Consciousness (Sipfle K. , 2018), see below.

Fundamental Consciousness (FC): The smallest element of what distinguishes consciousness; the actual smallest bit of feeling. Pure pain or pure pleasure. Somewhat similar concepts have been called pre-consciousness, protoconsciousness (Penrose & Hameroff, Consciousness in the Universe, 2017), microfeels (Poznanski & Brandas, Panexperiential materialism: A physical exploration of qualitativeness in the brain, 2020), and fundamental feelings.

Mind: An island of Animal or Human Consciousness. On Earth, each requires and belongs to at most one brain.

Cognitive: Related to thought and/or information processing and not to feeling (though in practice feelings typically *accompany* the cognitive).

Cognition: Thought, as opposed to feelings.

Perception: Informational understanding (not emotional).

Affective: Related to feeling, not cognitive.

Valence: Goodness/positivity or badness/negativity.

Emergence: A consequent complex whole arising from the interactions within a system, that takes on its own characteristics not describable/expected in terms of just the individual elements of the system.

5. Important Assumptions

This paper makes a few assumptions, which are out of its scope to justify (instead see (Sipfle K. , The Nature of Fundamental Consciousness (preprint), 2018)).

Postulate 1: Physicalism is necessary and information- and computation-based theories cannot provide for the source of conscious experience.

Postulate 2: Consciousness functions within the same basic rules (including mathematics) as all other phenomena that also exist in Nature.

6. Levels of Consciousness

We start by conceptually sectioning the vast scope of what is called "consciousness" into a few large categories of increasing capability (adapted from (Sipfle K. , 2018)).

Level 1 Consciousness a.k.a. Fundamental Consciousness a.k.a. Base Consciousness

> This consists of the smallest elements that represent experience. (This is where free-standing experience occurs, without an observer.)

Level 2 Consciousness a.k.a. Sentience

> Consists of everything that must be added to level 1 to make the sentience of the simplest sentient organism. (This is where "subjective experience" occurs- it introduces the concept of an observer.)

Level 3 Consciousness a.k.a. Mind

> Contains everything above level 2 that enables the behaviors and experiences up to the most complex of nonverbal organisms (by adding cognitive componentry).

Level 4 Consciousness a.k.a. Human Consciousness

> That which has been attained by humans (by adding the symbolic manipulation that is used for language) (Edelman, 1993) (Rolls, 2016).

Level 1 Consciousness plus Level 2 Consciousness are the foundation beneath the entirety of "consciousness" defined as "a bubble of experience" if that bubble "consists of colours, sounds, smells, tastes, etc." (Gamez, 2018). Level 1 Consciousness has its own elemental bubbles of experience, which we may call "psybits (as Eccles did)," but the experience is more primitive and not in all occurrences integrated into any kind of mind or substantial piece thereof.

We will see that Level 1 is the root of actual experience, rather like Layer 1 of a computer network, the Physical Layer, moving around real individual electrons. In both cases, all the rest sits on top and is connected assemblies and software built on Level 1. If we simulate Consciousness Level 1 and Level 2 and then put all the same algorithms atop them as we find in natural brains, we can get all the same behaviors, but that "mind" will not *actually* feel.

Level 1 Consciousness is the fundamental consciousness that is the physics manifestation of what is needed to build, from it, consciousness as we know it. The nature of this low level and the connection from it upward answers Chalmers's Hard Problem: feeling is a phenomenon of our universe that preceded minds and was discovered and exploited by evolution to build minds. Once we put the horse before the cart, the Hard Problem evaporates.

IV	**Verbal Mind.** Abstracting	More wiring and "Algorithms"	Cognitive
III	**Mind**.	Wiring and "Algorithms"	Cognitive
II	**Sentience.** Qualia	STFC	Affective + Cog
I	**Fundamental Consciousness**.	STFC: Particles, Fields	Affective

Figure 1: Levels of Consciousness

7. The Four-Layer Architecture: The Gross Architecture of Consciousness

Next, we move from conceptual and abstract observations to the question of how brains and minds are actually built. We construct as Nature did, in layers whereby each earlier layer provides a platform for the next and new things become possible. Our identification and classification of Levels of consciousness corresponds well, it turns out, with layers of architecture of real minds. These are shown in Figure 2: The Four Architectural Layers of Consciousness.

Figure 2: The Four Architectural Layers of Consciousness

These architectural layers of mind include, from the top down:

Language, integrated into thought.

Cognition, integrated with feeling.

Higher manipulations

Manipulation of base objects

Qualia, simple and complex.

Fundamental physics, whence come base feeling and objects that can be used to record information.

This we call the Four-Layer Architecture or FLA (colloquially the "Florida Architecture").

Now that we have specified the architectural concept of this evolved layering of consciousness, we shall discuss each of Layer 1, Layer 2, Layer 3, and Layer 4 Consciousness. In the process we also present our full-sweep ToC (Theory of Consciousness), comprising two sub-theories. The compliant and motivating theory described for Layer 1 and Layer 2 is the Sentonic Theory of Fundamental Consciousness, STFC. Strictly speaking, STFC is a metatheory, as it is agnostic on some specific aspects for which there are multiple candidates. The compliant theory described for Layer 3 and Layer 4 is the Systems Theory of Higher Consciousness, STHC. STHC is a synthesis drawing on the latest and best insights from neuroscience and theoretical and experimental psychology.

8. Consciousness Architecture Layer 1: Fundamental Consciousness

All phenomena we humans have identified have been seen to emerge from things that appear at the fundamental particle level through, maximally, the molecular scale.

Though we are not yet certain of the exact mechanism in Layer 1, we can characterize necessary key properties of it (and thus also speculate on actual mechanisms). This allows us to describe, without impediment because it is supposed to be more abstract, the nature of Layer 2.

Problems that will be faced in getting up to qualia (Layer 2) include

1. Qualia are not all of the same character.
2. Qualia are multitudinous.
3. A feeling is fused into a whole, and more intense feeling is a stronger whole. This is the "combination problem" first identified by William James, with many prior attempts to answer it (Harris, 2020) (Chalmers, The Combination Problem for Panpsychism, 2016).
4. At the bottom there are no Observers (in the mind sense), only observers (in the physics interactions sense) (Sipfle K. , The Nature of Fundamental Consciousness (preprint), 2018).
5. There must be a way- a path- for our minds to have evolved

We now discuss Layer 1 from the standpoint of what it must be like in order to support an explainable Layer 2.

Layer 1's province is the true indivisible, smallest feeling that can occur in the universe. Pursuing that leads us to some important (and non-traditional) conclusions.

First of all is the problem: for a feeling, who is feeling it? The process of drilling down to physics reveals that the question itself is essentially a meaningless assumption when we get to physical fundamentals rather than psychological concepts. When two electrons collide, which one is the observer?

> Feeling in its simplest form does not happen to an observer, it simply happens, as a freestanding event. The whole notion of a subject to experience something is a much higher development (and a true emergent phenomenon).

The Observer as we know it comes late in the upward progression. The Observer amounts to one clot of feeling and computation taking as input another clot of computation (and often, feeling). The Observer is a swelling in the unified corpus of mind and is not even 100% separated from the (internally) observed or 100% the same thing from one moment to the next.

At the bottom there is no observer, at least not one that is somehow fundamentally separate from the observed. Electrostatic interactions are not Observations, in a mental sense, they just happen. Fundamental feeling is the same way.

Secondly, our physics describes very well nearly everything in the so-called "physical" world, from the tiny to the immense and everything in between, while not at all describing such things as pain or pleasure. This tells us that

Postulate 3: Something *basic* is missing from, and must be added to, our physics, which is our description of reality.

Our feelings are real. Any Theory of Everything that really is that must include feeling or a way to make it. That the problem may be hard to solve does not make it invalid or meaningless as a problem. (Ironically, the only reason people study and develop physics in the first place is that they *want* to.)

The missing simplest physical feeling event we call Fundamental Consciousness. These are "psybits"; each functions as a "microquale" ((Poznanski, Theorising How the Brain Encodes Consciousness Based on Negentropic Entanglement, 2019) refers to somewhat similar "preconscious microfeels").

Notice that there is not necessarily anything especially quantum about this. But because the fundamental level of Nature, which is the quantum level, extends up to the molecular scale, the exact process of feeling may conceivably occur up at this scale (at the maximum) rather than the particle scale. The Architecture, which is a framework or meta-solution, makes no demand that precludes that.

8.1. The Quale Garden

The first thing we should note as to the emergence of qualia from physical fundamental consciousness is whether there is any difference between the two. The answer is Yes, and this is terribly important to understanding of mind. In fact, there is also a large difference in nature between the different qualia.

If a quale for Red really were fundamental in the universe, then there would have to be hundreds or more of qualia for all the other cited experiences- the taste of wine, the sound from a musical instrument and so on. Quite obviously this is literally unnatural. The grand "plan" in every case to date has been found to be a few simple fundamental elements, then placed in combination. This means the typical quale is actually a composite structure, that is, the "atoms" of feelings of the mind are not the "atoms" of feeling of the universe. So, we do need something smaller than a quale, or alternatively, some of the qualia are more elementary than others. At bottom will be the smallest experiences in the universe (the psybits).

The usually cited qualia include a cast that are deeply dissimilar, not peers.

Of special note are the differences between, for example, Red and Pain. First of all, there are a great many qualia (especially in principle) just as "elementary" as Red, which immediately suggests it is not a truly elementary feel. Second, there is nothing special about Red from the standpoint of the universe; again, it is just one arbitrary spot in a large field of characteristics

(even though as it happens our nervous systems are specifically sensitive to red light). Third and most saliently, Red has no intrinsic valence; Red is not intrinsically a painful thing or a bad thing or a good thing, it is just a factual condition.

Pain is entirely different in all three of these ways. There is pain and there is pleasure and there is nothing else in that family. Pain (or pleasure) is a very special occurrence in the universe, different from others. It has valence, and furthermore no factual content, only valence. The view that pain and Red are atomic siblings is false. Red and Blue and Shrill and Motivated are all of them more complicated than Pain and have internal structure. *To a mind*, or particular minds, they may be the simplest and most individual things detectable at the bottom, but that does not mean they are not made from simpler things (and they are).

In fact, the only clearly elemental qualia are pain and pleasure, the "emotional" ones (Sipfle K. , The Nature of Fundamental Consciousness (preprint), 2018). It turns out this is a profound observation and an important clue. Pain and pleasure are must-haves in the base feeling repertoire; no others are, they are constructed. The key categories of qualia, then, are Valent or Not, and Level of Complexity.

If a quale is a feel, then the simplest quale is the simplest feel. The simplest feel contains nothing other than feeling. This means a simplest quale cannot be about something, for then you have the feeling plus the thing about, and so here we encounter a difference in structural levels (levels of complexity).

To a mind, Red may seem as elemental as pain, because inside a mind you are sitting on top of everything needed to begin making one. This does not mean Red is as simple as pain inside the fabric of that platform. Indeed, this has been one of the primary confusions historically in understanding consciousness.

Even at the lowest level, one can't get from an "Is" (information) to any kind of "Ought" (which regards value and therefore feeling); the two different elements must become associated. The connection of feeling to information flows is ultimately what makes ideas "register." The idea is cognitive, the registration is feeling.

8.2. Necessary Qualities of Fundamental Consciousness

Qualia are the molecules of the mind, but not its quarks. And since qualia must be constructed of something similar (for workable emergence (Sipfle K. , The Primary Pitfalls on the Road to Understanding Consciousness, 2021)), this constructability becomes an essential feature of a successful architecture.

The answer is provided by the physical *field*, the mechanism that addresses another key problem, the fusion of feeling. This may be either an actual physical field (the "sentonic" field), which we presume is the simplest explanation, or in principle another mechanism that is different but very similar in character.

We address first the build-up from fundamental pain to quale-level (mind-level) pain.

Note that by pain we mean "the painfulness of pain." Pure pain is the dysphoric ("emotional") aspect, the negative experience that is the end result of everything that causes pain.

If you are in slight pain and it gets much worse, we know that you will be experiencing the effect of more neurons activating, not just one or two becoming tremendously more active. At a physics level, the effect is many more psybits (fundamental feeling events) occurring, generally in close quarters. But what you *feel* at the mind level is not 1,000 individual small dots of pain. Your mind experiences the *same, unified thing, greatly amplified*. This means there must be a mechanism adding and joining these psybits into the whole pain. Note that simply interconnecting these feeling spots with neural information signals is not enough- that would still be separate little feelings, possibly now synchronized in time but still isolated as feelings and linked only by informational bridges. An additional mechanism is needed.

Physical interactions are all the behavior of forces. In a force field, every spot is subjected to the influence of every other spot in the same field. What results is a three-dimensional (four, including time) intensity cloud of a specific compositional shape. With this fusion, the otherwise freestanding feels join into a larger cloud of feeling. This is why you feel one big pain instead of a thousand little ones.

Pain is special as a feel/quale because pain is pain, on a small scale or a larger scale. Pain flows up from Layer 1 to Layer 2 in a rather direct and simple fashion.

8.3. Hypotheses Contained in STFC

STFC Hypothesis 1: Fundamental feeling is freestanding and requires no separate feeler. At most there is a physical interaction between fundamental elements.

STFC Hypothesis 2: There is a physical process that is fundamental feeling.

STFC Hypothesis 3: The fundamental feelings are pain and pleasure.

STCF Hypothesis 4: There exist pain and pleasure in minimal discrete bits independent of any brain, at the particle scale.

These are discussed in (Sipfle K. , The Nature of Fundamental Consciousness (preprint), 2018).

Re layer 2 we will discuss the informational qualia, which are very different. For example our Pain *that is distinctly located* also activates primary and secondary somatosensory cortex. But the same mechanism we have been discussing still underlies these pains. A field mechanism is needed in the consciousness architecture.

9. Sites of Fundamental Consciousness in the Brain

Let us now drill down on the matter of the most likely sites of action for consciousness in the brain.

This question is actually three: which neurons hold the sites of action, which regions of the brain contain these neurons, and where in the neurons is the site of action. For the first two questions- the macroscopic world of the cortical region and the cell- the evidence is stronger. For the third- the sub-neural, molecular scale (where physics lives), we are further away from knowing.

Macroscopically and microscopically, some areas of the brain show no signs of consciousness. This suggests that certain neurons and not others have evolved conscious (feeling) capability, directly causing pain or pleasure. This means the former have evolved nontrivial, nonchaotic access to the sentonic field.

9.1. Macroscopic Scale

It is medically known that human consciousness requires only

1. Cerebral cortex ("for awareness")
2. The Reticular Activating System of the brainstem ("for arousal")

The RAS projects to all cortex but mainly to prefrontal cortex.

If we look at limbic brain tissue as pain/pleasure-related, we find that it omits the stellate cells of cognitive tissue. This suggests that the feeling neurons ae pyramidal. Throughout the cortex pyramidal cells are the "workhorse" cells, the primary (and evolutionarily long-standing) units of the cortex, while the others provide regulation, lateral inhibition, relay, and pattern preprocessing to the deciding and publishing cells, the pyramidals. Closely associated with pyramidal cells, however, are chandelier neurons, whose axons always synapse exclusively on the axon initial segment of pyramidal cells. Therefore, chandelier cells may play a role in consciousness.

Pyramidals appear especially in cortical layers III and V so one (or both) of these is probably the most conscious layer(s). The III pyramidals and V pyramidals differ, with the latter being larger, and as we shall see, are used for different processing.

Layers II and IV of neocortex contain many stellate interneurons which are evolutionary newer, added once consciousness was in place.

Pain (dysphoria) centers can be found in the anterior insular cortex and anterior cingulate cortex (discussed later). The ACC is unique in its abundance of spindle cell neurons, which are connected to the anterior insular cortex and which are only found in very intelligent mammals. The spindle cells may not be themselves a site of consciousness, and do exist in other places, but their high density here may highlight the special importance of this area for very smart, very aware animals and the importance of pain to successful mentation.

In pleasure (euphoria), the insular cortex and orbitofrontal cortex are probably involved.

9.2. Molecular Scale

Anesthetic experiments and pathology and injury studies (e.g., (Hemmings, 2019)) indicate that it is not receptors directly and it is firing sequences that cause consciousness (and also that some neurons make consciousness and others do not). Most likely, spike generation or transmission is related to consciousness by a very short causal path.

Consciousness appears to occur in axons. The charge travel pattern of a neural spike is complex, unusual, and dimensionally precise. Here we have a toroid of deluges of ions across the axonal membrane, itself traveling along the considerable length of the fixed-diameter axon.

This means the ion rush through these channels (Fain, 2014) may be the site of consciousness.

While dendrites often taper, axons maintain a constant radius. The exact diameter varies by neuron type. It is typically about one micron. No neuron ever has more than one axon (though it may branch extensively). The axon initial segment consists of a specialized complex of protein molecules.

Note that the physics of axonal spikes might be replicated by a constructible apparatus for experimental purposes. This would allow for more intense examination than is readily possible in a brain or even brain slice. (Effects discovered could then be sought in real brain tissue.)

Microtubules have been suspected in consciousness theories (Penrose, The Emperor's New Mind, 1989). Much like axons but at a smaller scale, they are of even more constant and small radius and run the length of the axon and whole neuron. They experience the toroidal voltage pulse running down the axon that possibly induces something in or on the microtubule. These precisely dimensioned microtubules might function as resonators of some kind. In our model they would produce resonances in the sentonic field, or of a causative agent. Subsequent spikes would regenerate a decaying resonance. Also worth noting is that many differing molecules bind to microtubules.

It is not clear yet what the exact mechanism is, but it is clear that there are several possible pathways for what is needed, which is ion control of sentonic events and vice versa. At a slightly higher level knowing that is all we need, and we can await the elucidation of the details.

The sentonic field provides another means, requiring no direct cabling, for points in the brain to communicate with each other (“ephaptically”) (Sipfle K. , Support for the Sentonic Theory of Fundamental Consciousness (STFC), 2019).

While cycling (and resonance) of signaling in the recurrent connections in neural networks may provide a regenerative effect that fortifies consciousness (and provide computation and correlation), it is not the base mechanism (cycling is a base mechanism of short-term memory, however).

10. The Nature of Sentience

Layer 2 takes us from individual glints of minimum feeling to our first unitary body of larger feeling. It provides the combining and fusing. It is the weaving of the elementary and separate into whole cloth.

This layer provides fusion, minimum awareness, and discernability between individual fused configurations.

This layer exists in physics, possibly chemistry, and brain biology to provide the needed surrounding conditions and location in the real world.

In keeping with Layer 1, there are two conceivable mechanisms providing this.

The first is the field. The nature of fields is such that each point is influenced by all neighbor points. Electrons for example form a summary, mutually owned electric charge profile owing to their relative locations. Sentonic charge and its local interactions would presumably have similar field effects.

The second possible contributor at this scale is quantum entanglement at maximum scales up to perhaps a millimeter. A problem with this mechanism, though, is that it is unlikely to serve at brain-size scales, as the brain is a messy, hot environment that would not support any large-scale entanglement. It could be speculated that while large scale, stable entanglements are infeasible, brief chains might repeatedly appear. The earliest actualizations of this layer could conceivably rely on entanglement across macroscopic scales, for example on the order of a neuron.

This layer is the first in which we now have a feeling object larger than elementary ones, that can then be impinged upon by external elementary ones or others like itself. Now we have something we can call sentient- a unitary blob responding to impingement with macroscale feeling.

In other words, at this level something resembling a Feeler occurs, a Subject, whereas before there were only equal minimal partners in mutual physics interactions.

Feeling is fundamental to the large-scale operation of vertebrates and not necessary to the behavior of other life forms, so this layer probably organized a bit before vertebrates but not greatly before. So far, we have no evidence that a single-celled organism or an ant has any reason to feel.

In addition to fusion this layer likely contributes or sets up for persistence.

Important and subtle things happen in this layer. A composite feeling and sub pieces thereof must be not only fused but individually distinguishable (Sipfle K. , The Solvability of The Hard Problem of Consciousness and its Relation to Fundamental Consciousness and Human Consciousness, 2019).

This layer provides “molecules” of feeling from which real qualia can be built.

Note also here that you can have an *awareness* of something without it capturing *attention*. As humans we would call such things "at the periphery" (because our actual or minds' foveas have not been fixed on them).

10.1. Hypotheses Contained in STFC

STFC Hypothesis 5: Some biological brains have evolved to organize and exploit pain and pleasure.

STFC Hypothesis 6: The fusion of feeling across the brain occurs in a force field.

11. Consciousness Architecture Layer 2: Sentience

Unification of information can occur in one way by the interconnected firing of informational components, but that does not explain a feeling of Red that is both unitary and different from a feeling of Blue.

One will come to know a feeling of Red through very long experience with it, but as has been oft-cited, exactly what red is like to me may not be identical to what it is like for you. What is important in the fabric of mind is that it feels like *something,* and it feels *different* from Blue, and from early on we then take these things (feelings) for granted as our minds continue to build.

Separate occurrences are not enough. *Both for feeling and for informational meaning* (which suggests the same mechanism is at play), we must have both the individual sub-aspects and unification of those into a whole. Assuming that there is only one level- qualia- is one of the fundamental errors in traditional thought on the topic, even before we get to the assumption that these individual qualia are the same thing as physics acts rather than compositions of physics acts.

We are provided an excellent clue toward the solution of the problem with pain (and pleasure). Pain is all the same, at all scales. It contains no information; it is purely valent.

Once we understand the necessary nature of fundamental consciousness, and that this is not the same as qualia, the next question presenting itself is how do we get from the former to the latter?

11.1. Meta-Symbols

To make thinking requires unique "symbols," things we can manipulate that represent other things. Even a symbol is divisible, and that is even before we deal with a symbol having both a name and an appearance. What is needed to start are unique identifiers- tags (meta-symbols)- to associate with large clouds of meaning. The tags, which are themselves each feeling clouds,

become associated with yet more clouds, for its name, for its written visual representation if any, plus possible explicit association with net feelings of goodness or badness.

This assemblage provides two things: feeling and unique pattern of real things in space. One such blob "feels different" from another, both in the sense of the blob doing its own feeling and of interacting blobs "experiencing" it (which is the underpinnings of mind, and which is two peers- being feeling- affected by each other).

The little clouds *feel different*. This, ultimately, is why Red is different from Blue and a hundred other "raw" feels. Red and blue must feel different, and we must have a means by which this can be so. This issue is right at the nexus between the cognitive and the emotional mental realms. It is not enough to be different informationally.

Different patterns of feeling in the clouds allow for the existence, recognizability, and reference of tags that are different. By themselves, they (the tags) have no meaning or clear symbolic identity, the purpose is simply to be different and distinguishable- unique identifiers. Precise visual or aural symbols can then exist- which themselves have some complexity- and then be attached to these tags, just as the many specific experiences that make up the meaning are attached to them.

What does "attached" mean? The attachment to both the symbolic detail and the meaning detail can be just cognitive- neural links that don't, themselves, have to feel. This is the connection between the what-it-is-like for the remembered meaning (and similarly for the visualization of the symbol) to the what-it-is-like of the tag.

These three identifiable clouds of experience (generic tag as a handle, symbolic name/description, and situational experience) will bump up against each other in the overall continuous train of feeling being created in the lower brain, while the higher has the parallel cognitive conversations, to whatever relative degrees the content has high cognitive content vs. high impact.

Each part of each cloud is being stimulated by a cognitive circuit (possibly by way of an additional connected neuron whose only function is to tweak the field), and then unified by the natural field(s).

Cognition evolves to where the differentiated and distinguishable tags become persistently associated with much larger "clouds" of cognitive activity. With these handles, entire ideas can be effectively referenced and manipulated.

This is what "meaning" is to us. "Meaning" as a term in common use means: 1) a collection of informational associations and 2) subjective experience of it. This is the blossoming of "what it is like."

Information is patterns of things, as with an abacus, and in full reduction the only things needed are the feelings. Anything else is intermediary, inert in the sense of importance to the abstract theory and architecture, other than to help arrange the patterns (which is where the wiring of the brain and physical shapes of neurons themselves come into play).

Random variability in the structure of neural nets and neurons yields unique, distinguishable signatures of the clouds of psybits mutually influencing across space where these activations are happening in the brain. Red feels like something and Blue feels like something and they are different.

The full picture of this is feeling stimulated in the field by informational circuits and a return path (otherwise feelings would have no effect), and this occurs both very far down and at multiple levels, ascending with the size and sophistication of thoughts (bigger concepts will literally be larger than tiny concepts). There is a very intimate and deep back and forth of feeling what is known and happening and knowing what is being felt that forms the stuff of our minds (so much so that it has been difficult for us to tease these two strands apart).

It is necessary to have physics at work up to the point of constructing qualia. Qualia are the link from the actual to the abstract. Qualia are a conceptualization of the reality of feelings. With the "hardware" realization in place, we can manipulate and trade in the constructs conceptually, and the rest of the stack becomes "software" (and connective wiring). An important transition is made at this point: feeling is absolutely critical to how our minds work and this must be understood. Once it is, though, feeling can be considered a known aspect and discussed and used in an abstract way in recognizing a working architecture that relies upon it.

We note that feeling provides "information" of a sort, but with important difference from ordinary information. Feeling enables a key portion of the control section that guides the operation of the data paths and computation, and this is going on at all levels of the mind (though not in all portions).

The difference can be understood in terms of implications. Knowing of either kind can be *encoded* in information, which is then read so as to know what is in the message. The knowing elicited may be of a fact or of a direct pain/pleasure experience. The two are different, even though both may be represented and, in that way transported, by information (and even if information is the patterning of feelings).

Another way to see the distinction is: Given enough book knowledge to read and enough mental ability and time you might understand any fact presented. However, to know what an experience was actually like can only be successfully transmitted to someone who has had the same experience or similar experiences. Otherwise, one must resort to knowing factual features about the experience and cogitating about a described experience instead of being able to emulate personally the experience of the sender, to sympathize.

The top two layers of the architecture presented do not discuss physics, they discuss the structure of our minds. The bottom two layers explain what the fundamentals are for the top two layers to work with, and make the connection up to the bottom of what we can introspect to, and call for specific explanation to ultimately prove those things at that bottom are the atoms of mind, validating the assumptions made by the higher two layers.

Note that stratification into layers correlates nicely with the different disciplines; neuroanatomists' findings, for example, are especially useful throughout Layer 3, and harder to use in explanation beneath or above.

We have seen that cognition manipulates information and so is not of necessity related to the stuff that encodes it. Feeling is not about information and has everything to do with actual physical process. This means in its simplest form, mind needs nothing more for the stuff than the feeling, and the wiring that helps pattern the occurrences of the feeling; no other stuff is strictly required other than to maintain life and the mechanics and housekeeping of biological functioning.

While we are here in the discussion, we can point out that this leads (distantly) to a subbranch of the present thinking that is (much) more speculative but not devoid of merit, involving the belief by some that life itself involves the fundamental consciousness force. The primary rational support for this notion, which probably originates from a "transcendent" suspicion (as did also that we are related to animals and stars), derives from the realization that feeling had to be discoverable by evolution. One possibility, then, is that the feeling necessary for our world was discovered quite early by evolution and has been used to enable life processes that speak little (at least, obviously) to its experiential nature, just as electromagnetism and gravity have been used early and often. Note that base consciousness is expected by this paper to be variations in a field present everywhere. From the other direction, it is also possible that our particular region of space was particularly seeded not only with proto-life elements but with proto-consciousness elements.

11.2. Primitive Self

There is a self- the one- before awareness of self. When do things enter one's consciousness? When the chief, large, dominating (though shifting) cloud of feeling with embedded cognition that we call Me is affected by other clouds- when they come into effective contact because of out of a background of feeling noise there is a local strengthening that bridges into the primary Me. The Me is already a large cloud of assembled feelings, that has a (fuzzy) perimeter- a cloud that hangs together with only thin "mist" of disorganized consciousness between it and other little clouds.

To enter your conscious mind, you must feel what is entering. Not to feel is not to be conscious of.

To be conscious of is not the same as the core mechanism of attention, which is a cognitive (that is, unfeeling) mechanism. What you feel will in large part (the other part being cognitive things like difference) determine what the attention circuits bring into focus, and the cognitive things (and feelings, too, as objects of attention) then amplified rather than suppressed will in turn result in feelings, which will then affect attention, but the attention proper is a cognitive device. Feeling occurs in its usual independent and passive way yet determines and thus drives the direction of thought.

Split-brain studies show one self in each hemisphere of the brain (even when still connected, the informationally linked but separated hemispheres may have distinct emotional lives). This suggests a prediction about the field strength formula of the consciousness (sentonic) force: it should feature high influence in the micron-millimeter scale and poor influence at the centimeter-meter scale. That would also make sense from an operational utility standpoint: Goodness v. badness values are most useful when they summarize each of subsets of everything that is going on.

11.3. Qualia

Qualia are the essence of the Hard Problem. Qualia are at the bottom edge of human mind (which is a whole represented by intense interconnections both mentally and physically). The bottom of the mind is well above the physical level making it possible, that is, fundamental consciousness.

In analyzing this layer, pain and pleasure are interesting as subjective experiences that are included as basic experiences to every human mind, but that do not demand a substantial range of possibles, as qualia (such as colors), in general, do. Suffering and pleasure are distillable in pure form from the human mind, and there is only one essential member of each of those two experience classes (or just two of one class if you prefer), not a spectrum or family.

In contrast, Red is *not* a single raw feel. Red, and anything else we calmly notice, has *impact*, a feel shared by many other "raw" feels. Furthermore, it is a visual (possibly envisioned) experience, and additionally to those two facts, it is also red.

Impact is like pain and pleasure without the sign. Impact is neutral oomph. (Impact may simply be a composite of negative and positive.) Minimum awareness is naked impact.

While this quale- red- may be among the least at once that the mind can do, and in that way this supposedly elemental thing may be atomic to the mind, it is already clearly made of multiple things. Commonly mentioned qualia are not the rawest of raw feels; they are more complex.

Such a minimal, actual experience for us is likely to be an *assemblage* of some kind of that which applies at the elementary physical level.

How do we feel red and blue? A little piece of your brain will light, consciously, when blue light comes in. However, this piece in isolation would not influence the connected whole of consciousness that we call the mind; it would be an outlier. This piece of brain is connected closely with a piece of brain that activates for any such visual color input (these connections are either direct or effectively so). Now we have a mob operating in concert, the experiencer of blue, and the experiencer of visual color upon which other color experiencers converge. This explains both the specific and the more general experience which are happening together. Yet higher convergence is to vision as a whole (fusion). These elements of experience are integrated into a whole, yet with introspection we can detect that both a common visual awareness and a specific blueness are occurring.

What then makes the activity of the red brain patch different from the activity of the blue brain patch? One can say they are separate and so can hold separate information but that is only half the answer. Furthermore, there is nothing at bottom to us that feels special about red or blue, yet they *feel different*.

The two patches of brain tissue will have different microdetails physically, which could cause differing blobs of fundamental consciousness actions (psybits) in space (with these psybits in contact with one another by virtue of their field). It is not important on this point what the exact arrangement within these blobs is, just that they differ. The degree of difference is yet more pronounced with fundamental consciousness coming in positive and negative flavors, because there is not only an amplitude shape in space but also a pattern of +/- psybits within the blob.

What is happening is that the detailed tapestry of individual spots (psybits) has different detailed composition, so the feeling of the little mob is different. This effectively gives differentiating identities to each particular feeling; the experience of each is a little different (these then become associated in groups at higher levels of the mind, into richer experiences).

In a signed theory, a typical glob will have *impact* but not pain or pleasure because the plus and minus psybits cancel each other out *overall,* but each *pattern made* of the individual psybits exists and is different.

(*Continued on Part II*)