

## **Sensualism (the Universal Correlates of Qualia)**

### **Qualia are physical, objective and real**

*"the objects and attributes which are presented in perception are in no way dependent for their existence on being perceived; nor is there any mystery about what objects are like when we are not perceiving them. Even when unperceived, they are essentially as they appear when they are being perceived...Perception serves merely to disclose, in part, the inherent nature of things...one could think of awareness as a kind of searchlight, sweeping around an inner landscape. . . . The searchlight may be thought of, in part, as revealing qualities that were already part of this landscape, rather than as bringing these qualities into being"* Michael Lockwood

*"sense-data are merely those among the ultimate constituents of the physical world, of which we happen to be immediately aware; they themselves are purely physical, and all that is mental in connection with them is our awareness of them, which is irrelevant to their nature and to their place in physics."* Bertrand Russell

*"Before Galileo, people thought the physical world was filled with qualities: there were colors on the surfaces of objects, tastes in food, smells floating through the air. ..Galileo's solution was to propose a radically new philosophical theory of reality. According to this theory, the qualities aren't really out there in the world, rather they're in the consciousness of the observer. The redness of the tomato isn't really on the surface of the tomato but is rather in the consciousness of the person perceiving it..."* Philip Goff

Sensual qualities such as colors are fundamental elements within the physical world since they are given brute elementary facts. When I am sitting at the beach and looking out over the water I see a sailboat in a blue sky with white clouds. If I turn my attention to the left and gaze down the shoreline and then turn back to look straight out, the sailboat and the clouds reappear maybe slightly in a different position, because they are out there and not in me. There is an observer, me, and then the world out there made of real things existing independently that my observations reveal. There is a world made of objects and subjects that exist in relative positions that move continuously. Those objects are directly sensed by the observers because they have colors, emit sounds, and can be touched. That is the real world of common sense that we all intuitively believe in. But science since Galileo tells us that this common sense world view is naive. When I close my eyes, everything turns black. The qualities by which we perceive the sea, the sky, the sailboat, were all only images created in my brain and have no existence outside of it. This paper presents a return to common sense: the world of colorful objects out there continues to exist while my eyes are closed and opening them up reveals them once again. How to reconcile - are qualities only in the mind/brain or only in the world? The answer: they are in both the world and the brain which is one with the world.

Our conceptions of the physical world depend on qualia. Sense qualities or qualia form the foundation of everything we know about the world. That is not to say they are everything that is. This is not idealism - what are normally considered the only physical beings: space, time, location, velocity, matter, mass, electrons, quarks are also real and exist. But in some way these abstract physical qualities, what Locke called the primary qualities, are also secondary to the sense qualities such as colors, sounds and feelings. That is because these abstract physical qualities are only known, knowable or even imaginable in reference to the sense qualities. Without any color, sound, feeling, smell, taste there is not even a way to conceive what a physical world is. Without anything to hear or see or feel yourself bumping at night into, there is no measurement, there is no observation, there is no science, there is no world. Sense qualities are not only indispensable for measurement and observation but also for any imagined conceptualization of the physical world. If colors and feelings do not exist out in the world and never existed until the recent evolution of brains then our conceptions of the physical world can bear no resemblance to it. Says Lockwood: *“Rather than being, so to speak, right up against the world, the mind is conceived as being set back, or set apart from it. ...The traditional Cartesian picture, so this line of thought proceeds, does not just threaten certainty in regard to the external world; it threatens ‘loss of the world’ altogether. It places the world where the mind cannot reach it, even in thought”*.

In this paper I will attempt to recapture the “naive realistic” worldview of the ancients before Galileo, Locke and Descartes imprisoned qualia within the soul and modern science relegated it to the brain. Because qualia are foundational non derivable elements, givens, brute and indispensable facts, they should be promoted back up to essential ingredients of the material physical world. They are the paint in the painting, what Whitehead called “eternal objects”, the fundamental facts and given attributes from which all subsequent knowledge is built.

The brain receives messages through physical processes which create a chain of physical events in the nervous system that at some point somewhere in the brain generate sense qualities. In that way, qualities are also secondary because they appear conditionally at the end of a chain of physical events. Breaking the chain at any point stops the qualia as when we simply close our eyes. Matter, the stuff of the world, is the hidden theoretical physical something, the cause behind the scene that has the ability to generate qualia. Qualia then are seen as the clothing of matter, the way that matter can make itself known, the flip side of the material coin. If sensations were not physical we can never even indirectly know matter and measurement and science could not exist.

John Locke, following the lead of Galileo and Descartes, saw qualia not as public properties of the world but as private properties of the soul. While Locke’s view contradicts the general folk psychology that people intuitively believe where observers have transparent access to the sensual world, it remains the belief most prominent in science and philosophy to this day. Whitehead said of this modern academic view: *“Thus nature gets credit which should in truth be reserved for ourselves: the rose for its scent: the nightingale for his song: and the sun for his radiance. The poets are entirely mistaken. They should address their lyrics to themselves, and should turn them into odes of self-congratulation on the excellency of the human mind. Nature is*

*a dull affair, soundless, scentless, colourless; merely the hurrying of material, endlessly, meaninglessly.”*

But there is a reason why poets and common sense folk view qualia as part of the world and not part of the self. Qualia seem to be attached to external objects that have nothing to do with me and nothing to do with each other. I seem to be an observer of objects with qualities that exist independently of my observation. It is quite a surprise to me when I step outside and see the bright red of the cardinal sitting in the bush and hear the noise of the neighbor's car starting up and feel the cool autumn breeze. Certainly they have an independent existence that had nothing to do with me or anything I wanted or expected, and not only that, they have nothing to do with each other. The red belongs to the cardinal and the noise to my neighbor's car and the chill breeze to the cool air. The qualities are in the objects and that they appear simultaneously inside the field of my awareness seems thoroughly accidental and irrelevant to them and just as accidental and irrelevant to the gaze of attention that is me. I can make the whole colorful scene disappear and reappear simply by going indoors and then stepping out again. Because of this loose-coupling it seems obviously natural, this common-sense belief, that sounds and colors belong to the objects outside of me to which I am but a witness.

The common sense view is not the academic view which is passed down from Galileo and Locke and affects the theories of today's neuroscientists who conflate the gathering and information processing of sense modalities with the binding of those modalities into a single conscious being. Scientists and many modern philosophers assume that there is one problem, the mind, and how the physical world creates a mind filled with qualia such as colors and sounds. This failure to differentiate two distinct problems, the problem of how the physical world generates sensible qualities and the problem of how they can appear simultaneously part of a single conscious mind, creates an overly complex pseudo-problem that can never be solved as it is based on a false assumption. There is for instance the problem of how the brain generates sounds and within a different modal subsystem a field of colors, but equally the problem of why they simultaneously appear bound to a single observer. By making colors depend on minds an unnecessary barrier is erected between matter and its physical sensory attributes.

Even if a system in the brain is proposed to create a visual field of colors and another separate system to create sounds then a third system is needed to tie them together into a single conscious mind. But how then can the third system ever tie them together since they don't exist until the mind exists, each being mutually dependent on the other? There is a lack of loose system coupling here: each system is tightly bound so that the mind can't exist without sounds, colors and feelings and feelings cannot exist without an observer. And yet the sense modalities do appear to be quite independent of each other and independent of me. I close my eyes and nothing of my existence as an observer has been touched though my visual field is now black. Once those sense qualities are viewed as part of the world then the observer returns to the familiar role of observer, merely viewing and then perhaps acting upon what is already out there in reality. The green of the forest, the blue of the sky are out there, outside of me, they are

disclosed to me and become part of my world view when I am in a certain nearby location and have a certain perspective.

But that location is not just my body, at this moment perhaps being out in the woods, but my mind being located inside my brain which is inside my body which is in the woods. So even though I am in the woods I won't see the green of the leaves until I open my eyes. But opening and closing my eyes while drastically affecting the content of what I see doesn't touch me at all as the observer – that thing which is capable of experiencing its environment. My world goes from black to brilliant color in the flick of an eyelid and this only points to the absurdity of a worldview that conflates my existence as an observer with the qualia observed. They are independent and the observer in its stillness and aloofness remains unchanged by the fickle appearances out in the field of sensation that it observes.

So the colors and sounds I see are in the brain which is part of the physical world. It is the same brain, continuous with and made of the same particles of the world that surrounds us: quarks, electrons and photons, and as far as we know operates according to the same physical and chemical principles. To suggest that colors and sounds never existed until billions of elementary particles formed neural networks is incompatible with anything that we understand or can understand as a fundamental physical law where complexity is explained by simplicity and not the reverse. It would not make any sense that there is something about the brain that is so physically unique that only within the brain can qualia spring suddenly into existence for the first time ever. It would seem quite bizarre to me to think that qualia such as colors which are the eternal non derivable fundamental simple given brute facts of all our knowledge of existence can only appear under the most unusual complexity of circumstances. It is more consistent to think that qualia are built into the very material fabric of existence and they are part of the real world outside the brain as well as in the perceptually enhanced "re-presentation" within the brain. Says Russell: *"We have not the means of ascertaining how things appear from places not surrounded by brain and nerves and sense-organs, because we cannot leave the body; but continuity makes it not unreasonable to suppose that they present some appearance at such places."*

Evolution is a process of experimentation with small physical organizational changes over time. Evolution must work with physical elements that already exist. Only if qualia already exist as physical possibilities can evolution figure out a way to use physical processes to generate them in the brain. Since qualia are physical and fundamental most likely such a process happens at a more basic atomic or molecular level, a lower level than what is often proposed. The higher level biological nerve processes merely act as unconscious computation to bring about the end result in which qualia are created by employing the more fundamental laws of physics. In other words, the problem of how qualia are generated is a fundamental problem of physics, and cannot be solely explained by biology or neurology. The brain at a high level uses pre-existing low level physical principles for generating colors and uses other physical mechanics for generating sounds. So that while the complexity of neural signaling generates the high level functions surrounding learning, memory and skill it is at a physical micro level that phenomenal qualities are created. The chemist turned philosopher of mind AG Cairns-Smith for instance

proposed that a class of proteins (large molecules fundamental to biology while at the border with physics) he has called “qualagens” play such a role. For example, within the auditory sensorium: *“Let us say that E is a relatively large set of qualagenic proteins (“instruments of a particular sort”) making up a qualagen (“orchestra section”) that can produce a particular sensation (“kind of music”) when enough of them are caused to oscillate (“play”) together, the intensity of sensation (“loudness”) depending on the number of qualagenic proteins so activated.”*

Once we see that qualia are external physical entities we also see that we have the ability to share the same experiences. We can see the same colors of the changing leaves in autumn and feel the same cold north wind on our faces. We live in the same world whose qualities we can share. Of course we know it is only an approximate sharing. The real sharing of the same world could only happen if we were able to step inside each other’s brains where the virtual reality representation happens. But even this becomes logically a possibility, as opposed to a world where qualities exist only privately and we can never assume to share in the same world of experience. In such *“a congeries of solipsisms”* to quote William James we are forever locked into our own private universes and we can never speak of really observing, listening or even measuring the same things. In such a cold world view we can never even in principle hope to *“meet in the same”*. We can think of the virtual reality in our brains as like watching a baseball game on television. We realize we are not physically at the game and yet we believe it is a good enough simulation that the real game may not look that different. The real world outside of our brains may be somewhat unknowable to us but may not be that obscure, still consisting of objects with locations and shapes and colors and sounds. Like watching a ball game on television, we know it’s only a copy yet it is a representation that comes close to what the real thing would be like for fans attending in person. Why assume that the world outside is so different from the one inside as to be totally unfamiliar and that brains were able to create something radically new for the first time ever? The cost is too high: the loss of “common sense”.

Given common sense that qualia appear to be in the world and not in the minds of observers, why would Galileo and then Locke restrict all sensations to the mind? The motivation may have originally come from not wanting to infringe on church dominion, for taking qualia out of the soul would remove it from God’s jurisdiction and make it a product of deterministic physical law. It seems that the only logical argument for mind dependence comes from exceptions rather than general rules. The exceptions are that certain feelings such as physical pain and private thoughts cannot be shared. But this may only be because two people in the same location hearing and seeing the same things are still only close to being in the same location. To be truly in the same location I would not only have to be standing next to you, but I would have to be inside of your brain, inside your body rather than my own. If this could be achieved would there still be any reason to needlessly duplicate a separate copy of sensations in each mind? If I were inside your brain and then can see, hear and feel everything the same as you including your private thoughts and pains would there be any reason for those thoughts to not be considered in a public shared space rather than private copies? Said James: *“Do our minds*

*have no object in common after all? Yet, they certainly have Space in common. ...On pragmatic principles we are obliged to predicate sameness wherever we can predicate no assignable point of difference. If two named things have every quality and function indiscernible, and are at the same time in the same place, they must be written down as numerically one thing under two different names. ...In general terms, then, whatever differing contents our minds may eventually fill a place with, the place itself is a numerically identical content of the two minds, a piece of common property in which, through which, and over which they join."*

John Locke said material objects have "*powers to produce various sensations in us by their primary qualities*". Locke proposed a lawfulness in the organization and movement of matter that has a somewhat arbitrary but causal association with sense qualities in our mind. If we leave out the unnecessary complicating restriction that this association must exist inside the mind of a perceiver we are left with the basic insight: the existence of psycho-physical bridge laws connecting material movement with the generation of sense qualities. This idea can be traced to the ancient atomists and for them qualities were not mind dependent. Lucretius wrote: "*Let us suppose, then, that the atoms are naturally colourless and that it is through the variety of their shapes that they produce the whole range of colours, a great deal depending on their combinations and positions and their reciprocal motions*". Certain patterns of organization of matter which are causally primary will engender or instantiate certain sense qualities so that as Locke illustrated, a knife piercing the skin will cause the sensation of pain. While the association between the formal pattern of physical particles and sense qualities seemed arbitrary to Locke and possibly the result of God's whim, it also appeared to follow certain consistent deterministic laws. That is the same patterns of material movement will instantiate the same sense quality each and every time. **Such psychophysical laws I will call UCQ or Universal Correlates of Qualia as opposed to NCC (neural correlates of consciousness)** because the assumption here is that these laws are at a foundational physical level rather than biological (or emergent) and also because we are not trying to do the impossible and solve two separate problems (the generation of sense qualities and the generation of a perceiver of those qualities) with one law.

To bring back the previous analogy, we can imagine watching a baseball game on television as a metaphor for a representation in our brain where the external reality is in some way unknowable but could also have some features similar to what's in the representation. For instance, imagine a baseball fan named Mary who only has an old black and white television. While Mary has a somewhat impoverished experience compared with a fan attending the game in person and she misses out on the vivid colors, sounds, and smells, yet she loses very little understanding of the game. What matters are the form of things, and without some matching to the reality in the forms, the television game would be incomprehensible. Without some matching in the forms between our virtual representations and external reality, we would lose our ability to interact with the real world objects. Therefore Locke was essentially right when he said "*ideas of the primary qualities of bodies resemble them, and their patterns really do exist in the bodies themselves*". In fact Mary gains understanding that a live spectator may not have as she also has access to expert television commentary and analysis, video reviews, etc. Same with the virtual reality show in the brain which also has added access to the inner dialogue of commentary and analysis. The problem for Locke which was exposed by Berkeley was how can these matching inner and outer forms of the primary qualities be even imagined without

color. The answer proposed here is that the external forms do have colors, but we have no way of knowing what the real colors are nor are they relevant to formal geometry and measurements. Says philosopher Laura Gow: *"We know that we have no way of deciding which colour is the 'real' colour of the object in question, and no clear conception of what would count as 'normal conditions' yet, surprisingly, this does not prevent us from believing that the object really is a particular colour."*

In the nineteenth century scientist Gustav Fechner coined the term psychophysics to investigate the relationship between objective physical stimuli and subjective sensations and discover universal principles. Fechner called his techniques "outer psychophysics": deriving bridge laws between physics (such as tone frequencies) and psyche (reporting which has a higher pitch), but, for then, ignoring mediating physiology. Fechner anticipated a later "inner psychophysics" to develop bridge laws between physics and physiology (brain processing of stimulus energy), and bridge laws between physiology and psyche. Outer psychophysics is today considered largely irrelevant because it only shows a relationship between external events and the sensory nervous system. The generation of qualia is considered to be a process created by neural information processing. But if our UCQ theory is correct then the nervous system and its information processing is only a middleware computational level which in the end depends on and makes use of a more fundamental physical and material level to generate phenomenal sense qualities, the same phenomenal qualities that are natural and ubiquitous in physical reality. The nervous system uses existing psycho-physical bridging laws rather than miraculously inventing novel fundamentals.

The search for the inner psychophysics as the overly ambitious NCC has gotten us nowhere. We are not one inch closer to understanding what the NCC is or how it can generate with a single stroke not just colors, sounds, feelings and smells but the self that experiences them all simultaneously. But the outer psychophysics (though less ambitious) is something of which we have a great deal of understanding already: that is, certain light frequencies are associated with certain reported colors and certain objective vibrational tones are associated with certain subjective auditory pitches. Therefore I will take them as my starting point for proposing specific UCQ that are subtly but not greatly different from what is already known about these outer psychophysical laws that are fairly well understood but not now considered of fundamental significance. Perhaps it is not a one way street and a deeper understanding of the causes of qualia that are universal and physical can even add some insight into and broaden our understanding of physics itself.

## Color and Space

*“The view that modern science leaves no place for colors in the objective world, notwithstanding the testimony of common sense to the contrary, is one with a long history. Descartes and Galileo, for example, maintained that colors exist only in sensation, in the minds of perceivers, even though common sense holds otherwise. Science, they supposed, drives us to the conclusion that colors are really intrinsic properties of states of perceivers, properties that the ordinary person mistakenly conceptualizes as belonging to mind-independent things....I want to examine the charge that there is no room in the objective world for color. In particular, I want to defend the view that colors are objective, physical properties...The obvious view of color, at least as far as common sense goes, is that the colors we see objects and surfaces to have are observer-independent properties of those objects and surfaces...We take it for granted that objects typically retain their colors when they are not seen, thereby helping us to reidentify them.”* Michael Tye

*“At least since Locke (1689, Book 2, Chapter viii), color scientists and philosophers have been inclined to deny any objective reality to the familiar ontology of perceivable colors, on grounds that physical science has revealed to us that material objects have no qualitative features at their surfaces that genuinely resemble the qualitative features of our subjective color experiences. Objective colors are therefore dismissed as being, at most, ‘a power in an object to produce in us an experience with a certain qualitative character.’ Accordingly, colors proper are often demoted from being ‘primary properties’ (i.e., objective properties of external physical objects) to the lesser status of being merely ‘secondary properties’ (i.e., properties of our subjective experiences only). To be sure, we are not logically forced to this eliminative conclusion by the failure of the first-order resemblances cited. A possible alternative is simply to identify each of the familiar external, commonsense colors with whatever ‘power within external objects’ it is that tends to produce the relevant internal sensation. More specifically, we might try to identify each external color with a specific electromagnetic reflectance profile had by any object that displays that color. The objective reality of colors would then emerge as no more problematic than is the objective reality of the temperature of a gas (which is identical to the mean kinetic energy of its molecules), or of the pitch of a sound (which is identical to the dominant oscillatory frequency of an atmospheric compression wave), or of the sourness of a spoonful of lemon juice (which is identical with the relative concentration of hydrogen ions in that liquid).”* Paul Churchland

I will make the assumption that the UCQ (universal correlates of qualia) of color has to do with the vibration of charged particles. Specifically charged particles such as electrons will generate a field of color corresponding to the frequency of vibration. In this way colors are near or emanating from the objects themselves which are made out of vibrating particles and objects can be said to objectively have color. Electromagnetic fields of light made of photons are able to communicate about these particle vibrations to the eyes, but light is not the source of the color qualia and is merely a carrier of information about colors which are in or near the objects themselves. The material's electrons always vibrate and the red car remains a red car even at night, but in the absence of illumination its intrinsic redness will not be communicated to our mind's eye. Note: in my UCQ objective color is generated by the actual vibration of electrons not the reflectance profile of matter which is a side effect of the electron vibrations. The selective absorption of light by a particular material occurs because the selected frequency of the light wave matches the frequency at which electrons in the atoms of that material vibrate. Since different atoms and molecules have different natural frequencies of vibration, they will selectively absorb different frequencies of visible



light. So while materials vibrate and have colors even in the absence of light, absorption and reflection merely serve under the right conditions to communicate to our brains information about matter. It is clear that the matter in our brains, which is continuous with the matter and the physics of the external world, also generates colors in its virtual reality representation which do not depend on illumination and reflection of light within the darkened brain.

In my view colors are not identical to the particular form of physical movement they are associated with, but are objectively caused by that kind of physical energy or electrical vibration. Obviously the sensation of redness and the vibration of an electron are two different things. I am with Locke in that the vibrations of electrons are primary in happening first and then generate the colors secondarily. The vibrating electrons then act as spatially layed out colored pixels. One of the things to notice is that when color qualia are generated from the vibration of particles such as electrons the colors spread out from their source to fill and extend over the surrounding space. This is why we do not see many little tiny particles surrounded by vast empty space thereby solving the so-called "grain problem". As the color fields blend we see a continuous extended surface of color and that is what we would expect if the many tiny particles generated colors that spread and merged together. Qualia by spreading and fusing, smooths out the world of infinitely small particles and quantum events. By spreading out in time and space, qualia create continuity from an underlying discontinuous material substrate of point-like particles interacting through impulsive sudden events. This spreading of sensations creates phenomenal spatial extension and temporal duration from a quantum world of extensionless points and durationless events. Furthermore, as colors caused by underlying electronic vibrations spread out and blend they can form new colors, so that an atom generating both green and red is seen as yellow in a process known as color mixing.

Spatial extension and color indeed seem to be inseparable. Descartes thought the key difference between the physical and mental was that the physical had spatial extension. But then when we view a map of the world with America on the left and Europe in the middle and Asia and the Pacific on the right is not the mental image extended? And isn't physical spatial extension not something that can be even imagined in the absence of some color to differentiate shapes and boundaries? In our map of the world we can see the shape of America and Europe bordering against the blue Atlantic but if there were no colors to differentiate between them so that for instance all the oceans and all the continents had the same color then we could not distinguish the shape of anything. In fact, the "four color theorem" in mathematics states that it takes a minimum of four colors to create any map. But it doesn't matter what the colors are as long as there are four different colors. The important thing to note is that it is impossible to conceive of the map of the continents and the oceans; that is to have any understanding of the physical space without using color to demarcate different boundaries and shapes. However, the different colors that are used are irrelevant to the abstract concept of the physical shapes. In other words, color is an absolute requirement for having any concept of a physical space and spatial form, but which particular colors are completely irrelevant. A white sphere on a red background or a red sphere on a white background will work equally well to show the abstract spherical form.

The philosopher George Berkeley took Locke's sensationless materialist view to its absurd conclusion by asking how an object can have a shape without having any color to differentiate it from its surroundings. Since, he argued, we cannot conceive of primary qualities such as geometric shape in the absence of secondary qualities and secondary qualities exist only in the mind then the primary qualities that an

objective science theorizes must also be mind-dependent. But Berkeley like Locke assumes there cannot be color external to minds. Take away this unwarranted assumption and it is an argument for naïve realism rather than idealism: the abstract primary qualities such as visual form cannot be conceived of as colorless so they must have real objective colors. Berkeley and other empiricists included both visual and tactile sensations as necessary spatial senses, but I will argue that the visual alone is the primary sense that gives the definitive conception of space.

Science was able to proceed based on the abstraction of a space without the causal relevance of any particular color but the mistake came when it was assumed therefore that objects had no color and colors were not in objects but in the soul. Galileo was able to say the color of a ball made no difference to how fast it fell to the ground but overreached in assuming the object had no color. Its particular color was merely irrelevant and could be safely disregarded when calculating forces and velocities. The denial of their causal efficacy did not warrant the removal of colors from objects altogether and we can see spatial extension is not conceivable without color. In modern natural philosophy and science, colors (like all sense qualities) were taken out of the world and became the province of the soul, the church and the supernatural order. In understanding the mind as part of the world, we will need to put colors back into the natural order and back into the physical world.

John Dewey explained: *“Greek science imputed efficacy to qualities like wet and dry, hot and cold, heavy and light and to such qualitative differences in movement as up and down, to and fro, around and around. The world was formulated and explained on the basis of the causal efficacy of these qualities. The scientific revolution of the seventeenth century took its departure from a denial of causal status (and hence of significance for science) of these and all other direct qualities. On account, however, of the conversion of this fact about scientific procedure into a denial of the existence of qualities outside of mind and consciousness, psycho-physical and mental functions became inexplicable anomalies, supernatural in the literal sense of the word. The error of Greek science lay not in assigning qualities to natural existence, but in misconceiving the locus of their efficacy. It attributed to qualities apart from organic action efficiencies which qualities possess only through the medium of an organized activity of life and mind...”*

Note: every patch of space is defined by and must have exactly one and no more than one color. This is called the principle of color exclusion - a piece of spatial extension at a single time has to be some color for that's what defines it, so for example, if it is all over red it cannot simultaneously be all over green.

Therefore, when colors originating from different objects spread out and meet each other they form a new color which is a compromise between these colors. If the original colors are red and green then the new color is yellow. Because spatial extension and color are intertwined and vision is the uniquely spatial sense this color mixing chemistry is specific to the visual sense with nothing corresponding to it in the other sense modalities. In a world like ours where there is matter and void, blackness represents the void - the empty space between things where there are no particles to generate colors. Black is the absence of spectral color but also a color itself - the color of empty space where there are no things. This also differentiates the visual from other sense modalities, where spatial extension is primary and is perceived as black even in the absence of any matter. When we feel our hands, we feel sensation in each finger, but when we look at them we see not just the fingers but the space between the fingers, for in the visual, the field is primary and every patch of visual field must have one and only one unique color.

Explains physicist Frank Wilczek:

*“When we receive several pure sound tones sounding together, we hear chords in which the tones retain their individual identity. Within a C major chord, you can hear the C, the E, and the G separately, and you’ll certainly notice a qualitative difference if any one of them is absent, or if it is notably louder than the others. And you can have more complicated chords, with more separate tones, each sounding different, practically without limit (eventually they start to sound like sludge, but it’s always sludge with distinct components).*

*On the other hand, as we’ve been discussing, when we receive several pure light tones - i.e., spectral colors - together, we perceive a new color in which the identity of the originals is submerged. For instance, mixing green and red gives a perceptual yellow, which is indistinguishable from (the perception of) spectral yellow. It’s as if you played C and E together, and as a result heard D!”*

Another unique feature of color is the existence of the color wheel, an appropriately visual representation of the colors forming a circle. In the color mixing example above, yellow is positioned exactly in between red and green on the color wheel showing why it is the result of mixing those colors. The color wheel is a purely empirical and in my view physical phenomena, like a fundamental law of nature, and was fittingly discovered by Newton, perhaps the greatest physicist ever. Yet, unlike other physical laws it is purely qualitative and subjective without any intrinsic quantitative properties at all. To be sure the outer-psychophysics relates objective frequencies to reported subjective colors, but it in no way predicts the real existence of a circle of colors where the mixing of complementary colors (any two colors that are on opposite sides of the color wheel) generates a brand new color, white, and the frequency extremes (red and blue) combine to form a new color within the circle, purple.

Writes the physicist Nick Herbert:

*“A surprising feature of the chromasphere is the circular character of the color wheel. Since the physical variable that corresponds to hue is the wavelength of light, and the wavelengths that human eyes respond to vary from 700 nanometers (red) to 400 nanometers (violet), one might have expected that the subjective sensation of color would likewise be spread out in a linear fashion fading away into invisibility at two limiting hues. However, unlike the physical spectrum, the visual spectrum loops back on itself, forming a color circle rather than a color line. The loop is closed via a nonspectral color purple— a particular ratio of red and violet light.”*

One thing to note about color qualia and the UCQ which generate them is that objects tend to be recognized by their shapes and colors which are semi-permanent attributes of those objects and this is why they lend themselves to being a spatial sense. The underlying frequency of vibration of an electron is a property or state that remains the same and is stable until there is an event that changes this state to vibrate at a different frequency, but even then it never stops vibrating and it never stops generating some color as if to announce “I am here in this location”. So every electron is always vibrating and always generating some color announcing its spatial location in relation to other objects and those vibrations are semi-permanent attributes that only change when there is an event that causes a state change to a new frequency of vibration and a new color. The car remains red and is recognizable as a particular red car until it’s painted blue, and the electrons in the paint generate redness and are stable until some molecular reorganization occurs. In this way the objects of the world have stability and can be directly recognized,

reidentified, and perceived in spatial relation to each other. Furthermore, where there are no objects there is the blackness of empty space and where there are many different kinds of objects of differing vibration and color, the colors spread out and merge to create new colors such as white, but at any patch of space there is always one and only one color which defines that patch of space and its relationship to other nearby patches of colored space.

As Churchland says:

*“Sounds are ephemeral: a bird, a musical instrument, or an animal emits a sound only occasionally, and the sound fades (as  $1/r^2$ ) to nothing as it promptly flees its point of origin. By contrast, a material body’s electromagnetic reflectance profile is a quasi-permanent and stable property of that material body. It will change only if the molecular structure of the body’s surface is modified in some way.”*

No other sense modality can capture spatial information as well as the visual sense. Certainly we can touch things with our left hand and right hand and hear with our left ear and right ear but these seem to be no more than a general sense of events in different places happening at the same time. Thinking of our color coded map of the world; only the visual sense can give that kind of rich perception showing the shape of all the countries at once and how they are all arranged simultaneously in structural relation to each other. Vision is able to capture the entire scene showing the spatial connectedness of objects as a unit. While the tactile senses have some spatial sense in that we can feel many tactile sensations in different locations at the same time, they are not all felt together in a single unified image which shows the relationship of each feeling to each other as in the visual sense. I feel my right arm, my left arm, the itch on my face; they appear at the same time but separately; I can’t directly experience the spatial relationship as a single whole between all of these. Vision uniquely presents a unified field where each pixel of color has a specific location on an x-y axis and every object has its place in relation to every other. This is why we commonly refer to other sensations as located in reference to a visual location, but the reverse is never true. The sound is coming from the visual image of the moving mouth, but never the reverse. The feeling in my left hand is attributed as existing in my visual image of my left hand. The feeling is pinned to its location in the visual object, but the reverse is never true. We never say that the image of my left hand is located in the feeling. Space as a 3 dimensional constellation of objects is uniquely portrayed by the visual sense which is the authority on the relative location of things. Every other sensation is pinned for its location to the visual field which is seen in perception as a unitary phenomenal visual picture showing the direct spatial relationships between all the inner colored objects. We can say that our visual perception, the visual field, is a direct snapshot of physical space itself as seen from a particular point of view.

This unified visual-spatial phenomenal field is not 3 dimensional, but 2 dimensional. The map that shows the location of color coded countries where we can mark our own current location is a 2-d planar image that we see within our 2-d visual field. But even though the visual field is 2-d rather than 3-d it still supersedes the spatial capabilities of all other sensations because all countries within the map can be sensed at a single instant showing all the relationships to each other as a whole. Even if we were looking at a globe of the Earth we would still only see the hemisphere facing us as if it were a warped 2-d map.

Said Locke: *“Speaking of adults now: the ideas we receive by sensation are often altered by judgment without our noticing it. When we see a round uniformly coloured globe—say of gold or alabaster or polished*

*coal—it is certain that the idea it imprints on our mind is of a flat circle variously shadowed, with various degrees of light and brightness coming to our eyes. But we know how convex bodies customarily appear to us, how the reflections of light are altered by the shapes of bodies; and so our judgment acquires a habit of immediately altering the appearances into their causes. Faced with something that is really a variety of shadow or colour, it infers what the shape is; takes that variety to be a mark of that shape; and forms for itself the perception of a convex figure and a uniform colour, although the idea we receive is only a plane variously coloured, as is evident in painting.”*

I agree with Locke that we only can see a planar view and it is our “judgment” that conceives the 3-d world. But rather than using a painting analogy, as per Locke, where the canvas is attached within its frame, we can imagine the 2-d visual field as a transparent window on the world. The window frame itself is subjective and mental but the layout of color patches within the frame are objective and physically real. The subject with its visual field has attributes that are not physical but indexical. I, the perceiver, am here now at this location and my 2 dimensional visual frame looks out in a certain direction at an objective world. The visual field is a direct transparent perception of a 2d slice of objective 3d space.

Now imagine the Earth globe slowly spinning and as it does other continents coming into view on the other hemisphere of the world. Our judgment of 3-d space is like this: a continuously moving series of 2-d images that reveals objects from different perspectives over time. The 2-d flat image can reveal a 3-d world only because of real or imagined movement over time. Similarly, we can imagine moving towards a distant object, and as we move the nearer objects move past us to our left and right and then disappear behind us, while the distant object grows larger. Our judgment of the depth of the 3-d world is thus conceptualized as a connected temporal series of 2-d perspectives.

Think of a cardboard box for packing something. Its box shape is a rectangular cuboid (three pairs of rectangles), but we can only perceive it in separate 2-d images. We can face it and see its front with a measuring ruler up against it and note its height and length but not its depth. To measure its length and depth we would need to get a top view of the box and from a side view we can also measure height and depth. Our understanding of the real physical 3-d world is thereby built from a temporal series of connected subjective 2-d perspectives. The phenomenal visual field presents a 2-d planar view of a 3-d space from a point of view, but that world is objective; if another mind with its own visual frame were in exactly the same place looking in exactly the same direction, it would see exactly the same thing and note exactly the same dimensions.

The transparent window frame of the visual field merely reveals the objective world of physical colors and shapes in existence from a particular location in space. The color patches within the visual field are real and are there independently of the number of viewers perceiving them. Russell called such physically real observer independent visual phenomena “*unperceived perspectives*”. Said Russell: “*Besides the appearances which a given thing in the room presents to the actual spectators, there are, we may suppose, other appearances which it would present to other possible spectators. If a man were to sit down between two others, the appearance which the room would present to him would be intermediate between the appearances which it presents to the two others: and although this appearance would not exist as it is without the sense organs, nerves and brain, of the newly arrived spectator, still it is not unnatural to suppose that, from the position which he now occupies, some appearance of the room existed before his*

*arrival.” “.....we can reasonably suppose that some aspect of the universe existed from that point of view, though no one was perceiving it”*

The reason why colors are real physical observer independent entities is that they are generated from the underlying physical elements, the point particles such as vibrating electrons, and then spread outward while weakening, mixing and blending with other colors and filling or creating space. What our window-like visual field sees is the generated colors that have spread out against it and which are unique to and define each planar patch of space.

Although everything I have said so far in relation to color and space is compatible with direct naive realism, the view I advocate is indirect representative realism. We are not looking directly at the world but a simulation, a virtual world created by our brain. The emulation evolved to be pragmatic and make us believe that for all intents and purposes it is the external world we directly perceive. For instance, we don't move around the inside of our brains but around the external world. Furthermore our perceptual representation of distances, locations, shapes and sizes must be fairly accurate in order to be able to practically interact with reality. There is no reason to believe that external surfaces do not have colors, but our color representations may not veridically match them and the practical consequences are insignificant for we do veridically perceive forms and shapes with our own subjective colors. That the colors of our representations do not match those of the world in no way implies that the world has no colors, for the brain is just a part of the world made of the same electrons, photons and quarks and is continuous with physical reality. Although the brain evolved to have a highly sophisticated and complex organization and can process abstract information, that complexity does not entitle it to then create simple physical elements such as colors had physics already not provided the psychophysical bridge laws for doing so.

The indirect realism advocated here: where a single 2-d visual field actually exists in the brain is often criticized on the account that neurologists have never seen colors in the brain. But this argument has been dispelled by Russell who noted that the neurologist is never actually directly observing another person's brain from the inside but can only directly observe the matter of his own brain. We are each enclosed in our own brains. The material of another person's brain, like all matter in the world beyond our eyes, can only be examined indirectly via the medium of illumination, light and reflection.

There is a complex chain of events leading to our internally represented view of the visual field. The chain of events only goes in one direction, from the light that hits the lens of eyes, to the retina of each eye, through to the optic chiasm that combines the left visual field from each eye to send to the right visual cortex while also combining the right visual information from each eye to send to the left visual cortex. The result being the right side of the primary visual cortex deals with the left half of the *field of view* from both eyes, while the left brain only understands the right side of the field of view. Any problem with any part of this unidirectional causal chain will cause defects with vision. But the end result is a mystery. Where does the left side and right side of the visual field from each part of the brain come together into the single visual field that we perceive? Some say it does not come together at all; there is no cartesian theater, no objective physical stage where the field exists as a single spatial entity. This is contrary to common sense. The visual field is perceived as a single atomic unit. We sense no seams, no discontinuity. Colors cannot exist without appearing as spatially extended objects and the visual field is inconceivable except as a field of spatially extended color patches forming a unified image. We seem to have a direct view of a piece of

real physical space that happens to exist within our brain. Then there must be a place where the visual field comes together as a whole and where the colors are generated forming a single 2 dimensional array, a physical object that we can directly perceive; a piece of real physical brain surface, like a television screen. If the space of the world is directly perceived then there must be a space in the brain where the visual field is directly presented. Says Osvaldo Pessoa Jr: *“In the view maintained here, the patch of color is in a region of the real physical brain, and when we see the color patch, we are observing directly this region of the optical sensorium...”*. Most likely the place where the two visual hemispheric images integrate into a single coherent screen that can contain the space of our visual image, the “visual sensorium”, is in an evolutionarily older sub-cortical area such as the optic tectum in the midbrain. For that region is pre-hemispheric and most likely from where core visual phenomenal consciousness evolved prior to the embellishment of cortical-enabled intellectualization.

The visual field is not necessarily driven just from the standard wavelengths of reflected light. For instance, rattlesnakes and other pit vipers superimpose visual images created from information from the eyes with infrared heat images from their special pit organs to help visualize their surroundings in low levels of light. Says Ed Yong: *“Some scientists think that the pits really are a second pair of eyes, tuned to the infrared wavelengths of light that are invisible to the main pair. Signals from the two organs are initially processed by different parts of the brain but eventually feed into a single region called the optic tectum. There, the two streams are combined, and information inputs from the visible and infrared spectrums are seemingly fused together by neurons that respond to both. It’s possible that the snakes really are seeing infrared, treating it as just another color. ‘It is a fallacy to consider the pit organs as an independent sixth sense’, neuroscientist Richard Goris once wrote. ‘What the pits do is improve vision for their owners.’”* Presumably the snakes create a single phenomenal visual-spatial field by fusing four images, from the two eyes and from the two heat sensing pits. Yong also explains how some birds are able to enhance their visual field using special receptors in the eyes that sense the planet’s magnetic field. Says Yong: *“These lines of evidence hint at a startling conclusion: Songbirds might be able to see Earth’s magnetic field, perhaps as a subtle visual cue that overlays their normal field of view...Perhaps a flying robin always sees a bright spot in the direction of north. Perhaps it sees a gradient of shade painted over the landscape.”*

It's not just heat radiation and magnetic fields that can enhance the optical-spatial-visual image, but supplemental auditory echolocation data may do the same for bats and dolphins. Richard Dawkins speculated about this in his blog:

*“I have long conjectured that the answer to the famous philosophical question, ‘What is it like to be a bat?’ might be ‘Pretty much the same as to be a fast flying, visually hunting insectivorous bird such as a swallow.’ I meant something rather specific by this. When visual animals such as swallows or people look at the world, we construct a simulation model in the brain, which is continuously updated by incoming data from the eyes, and hence bears enough similarity to the real world outside to allow navigation through it and pursuit of moving targets. The remarkable phenomena of visual illusions are best interpreted on the hypothesis that what we ‘look at’ is not the real world itself but our internal model of it.*

*When the ancestors of bats and dolphins began to use echolocation, probably tens of millions of years ago, their brains already contained sophisticated simulation software, sensitively tailored to perform the mathematical calculations necessary for high speed maneuvering. Rather than let that originally visual*

*software languish idle, it would have been entirely natural to commandeer it to the service of the new skill, echolocation. All that was needed was a new 'driver' module (to pursue the computer metaphor), that allowed echoes to update the simulation rather than retinal images. This is why I conjectured that bats 'see' with their ears. The scene, as perceived by an echolocating bat, might look very much like what a swallow sees, because both bat and bird are deploying the same kind of simulation model, to perform the same kind of task."*

Then another blogger posted a response disagreeing with Dawkins: *"I would suggest that 'what it is like to be a bat' is pretty much exactly like what it would be like to keep your eyes shut and get around using your ears — only with much better hearing and a lifetime of experience interpreting (building model for the world) based on what you hear. Another way of putting it, bats do not 'see' with their ears, they hear with their ears just like we do — only much better at it."*

Recent experiments back Dawkins position, showing bats process echolocation information in the optic tectum, the area of the midbrain known to be an ancient site for vision before in primates it largely relocated to the visual cortex. It has been discovered that some blind people have been able to make clicks like bats and have trained themselves to use echolocation to 'see' objects and navigate their environment. In these people experiments have shown that the visual cortex is used to create a map of the environment implying that the auditory inputs are perceived visually. Says Wlassoff: *"Thus, in both animals and humans, the information received through echolocation is processed in those regions that are also predominantly responsible for the processing of visual information."*

Echolocation experiments on dolphins have shown that a dolphin can immediately and accurately recognize the same shaped objects "seen" by echolocation visually on a television screen and vice versa. According to the researchers Pack and Herman *"It seems appropriate to characterize the mental representations of objects perceived through echolocation by the dolphin as spatial 'images'"*.

It should be noted that hearing and echolocation in spite of both involving auditory information are quite different. Hearing is passive. The ears are always open to the possibility of some unexpected sound signaling an event in the environment, while echolocation is a self generated exploration of the environment with the intent of building a spatial model. If it's true that bats and dolphins can see with their ears, then why is auditory information translated into colors rather than sounds? It is because the visual sense is uniquely able to take a snapshot of the relative position "right now" of many objects simultaneously layed out in a whole spatial configuration. The simultaneous scene provides a field of multiple immediate targets for possible action providing options for the hunting bat or dolphin to make a decision and steer towards that target. That is why sounds and feelings, which are more oriented to separate events, are not as good as vision, at mapping a complex scene of objective spatial relationships and why bats and dolphins most likely do translate auditory echos into a single visual-spatial field.

If the spatial sense is primarily visual, and our sense of a 3-dimensional universe where every subject and object has a simultaneous relational location is largely based on it, then how do people who have been blind since birth have any spatial sense at all? First, their spatial sense may not be as strong as people with vision. Says Oliver Sacks: *"We, with a full complement of senses, live in space and time; the blind live in a world of time alone. For the blind build their worlds from sequences of impressions (tactile, auditory,*



*olfactory) and are not capable, as sighted people are, of a simultaneous visual perception, the making of an instantaneous visual scene. Indeed, if one can no longer see in space, then the idea of space becomes incomprehensible - even for highly intelligent people blinded relatively late in life...*

Secondly, it cannot be ruled out that even congenitally blind people have some visual imagination. Bértolo says: *"The discussion around the term 'visual imagery' - seeing with the 'mind's eye' - is far from being resolved. Nevertheless the use of the term in our paper was carefully applied. We totally agree that sometimes blind subjects use terms as 'seeing' in their daily lives metaphorically. But this does not imply that they are unable to produce mental visual images. In informal talks blind subjects told us that when they sign their names they don't use a memorized set of movements, instead they 'visualise' their signature and reproduce it."*

The blind may still retain a visual imagination that enables the translation of touch data into visual images. As Hans Jonas comments on this subject:

*"Briefly, it is the image-faculty, in classical terms; imaginatio, phantasia, which makes that use of the data of touch. Only a creature that has the visual faculty characteristic of man can also vicariously 'see' by touch. The level of form-perception at the command of a creature will be essentially the same for both senses, incommensurable as they are in terms of their proper sensible qualities. Blind men can 'see' by means of their hands, not because they are devoid of eyes but because they are beings endowed with the general faculty of 'vision' and only happen to be deprived of the primary organ of sight."*

Vision represents a field of objects that are spatially related to each other in a reliable semi-permanent pattern. The landscape features, the mountains and trees move so slowly in relation to each other that they seem to form a dependable permanent framework and even though the moths that the bats chase move much faster, still they do not move instantaneously from one place to another. A bird doesn't suddenly and magically appear in the tree but moves from one tree to the next, its location changing in a rational continuous line. Vision reveals a space of objects that have stable, reliable, but continually evolving relationships with each other. But an event such as the feeling of pain or tickle, or the sound of an animal scream, can just pop up out of nowhere.

## **Feeling and Action**

*"The field of vision delimits a region of space at a time within which one may visually experience objects; no object outside of the field can be experienced without its either moving within the field, or the field itself being altered by moving one's gaze. The parallel field of receptivity for awareness of one's body can only be the apparent extent of one's body itself. ...But now the region of space apparently occupied by one's body cannot be an analogue in bodily experience for the visual field. It does not seem correct to say that what one experiences through bodily awareness is a region of space and objects located within it. Rather what one experiences are apparent parts of one's body, and happenings within it." from Martin, M.*

## The Direct Perception of Self

Having just spent much of this paper arguing that sensations are objective I must now backtrack and qualify that. For while visual sensation can be viewed as if through a clear transparent window onto an objective space, the tactile is analogous to a tinted window and adds an element of subjectivity to each perception. To give an example: the sailboat that moves across my field of vision either because it is actually moving or my own gaze has shifted is still recognized as the same object out there in the world and looks exactly the same no matter where it appears within that field. But for tactile feelings it is more complex. Feelings seem to be a combination of out there and in here; for example I feel the heat of a hot surface on my left hand. The heat seems to be an objective fact that anyone would feel but the feeling is in a particular place, my left hand, that is a relationship to me. This is not a transparent view. Two elements need to combine to create the sense quality, the recognizable quality of hotness combines with the recognizable sense of my familiar left hand to create the sensation of heat on my left hand. Unlike the sailboat that looks the same whether on the left or right side of my visual field, the experience of a hot surface feels entirely different in my left hand and right hand.

Furthermore, the feeling of my right hand, whether it is itching, or in pain, reaching to grab something or being touched is recognized as the same thing: my right hand. And the collection over time, of all continuous feelings of this warm, familiar body I have known for so long is recognized as a very special object in the world, me. Says William James: *“Each of us when he awakens says, Here’s the same old self again, just as he says, Here’s the same old bed, the same old room, the same old world.”*

While the visual sense gives us a direct perception of space it leaves the perception of self to our conceptual imagination. This caused empiricist David Hume to remark that there is no such ghostly invisible self but all we ever have is changing bundles of sensations. But while never directly perceived in vision, the inferred idea of a self as a “point of view” is near universal. The concept of the self as a specific location or perspective in a three dimensional space and moving in relation to other objects in that space has great practical appeal. So while never directly perceived, the inferred concept of self or “pure ego” derived from vision with a unique location and perspective in space, is of great value and is a universal common sense understanding.

So while the visual provides a direct perception of space and only an imagined conceptual sense of self, feelings are the opposite, giving a concrete perception of self and requiring conceptual imagination to attribute feelings to a visual map of locations. The collection of feelings is called “the body schema” and is not to be confused with “the body image” which incorporates visual imagery in an attempt to identify the spatial location of feelings. The body image, as conceptual, is susceptible to illusions such as the incorrect location of referred pain or the well known “rubber hand illusion” where we misidentify the visual-spatial location of feelings. Instead the body schema is an aspect of self that we have direct awareness of. In indirect realism, the body schema is a representation that exists within the brain so that a limb missing from the physical body may still be felt (the so-called phantom limb) as an existing body part.

Feeling is the somatic sense, the sense of one's own body parts. It is a multifaceted sense including the sense of touch or pressure of external objects on the skin, the sense of proprioception which includes the position and movement of the limbs, and the sense of heat and pain. Voluntary movement, the feeling of the use of muscles is an aspect of proprioception. Because we directly perceive distinct body parts that can sense and then be targeted for voluntary action, we can quickly act appropriately so that for instance we can withdraw our hand from a hot stove or withdraw our arm when it unexpectedly bangs into something. A predator, even in darkness, upon touching a recognizable prey can then grasp for it. The perception of the external object via touch and the movement of the corresponding body part through proprioception can be done in feelings alone with no need for any other senses. Besides the feeling sensations of temperature, pleasure and pain, even taste may be a kind of feeling as it is perceived to exist in particular body areas within the tongue. But this limitation may not be true for all animals. An octopus may taste with its whole body. And as we can sense heat or pain in a body location and then withdraw it, it may feel a noxious taste located in an area of one arm, that it can then pull away. Says Yong: *"...it simultaneously touches and tastes using 10,000 mechanoreceptors and chemoreceptors on its rim...Its sensation of taste and touch 'are probably inextricably fused' in a way that resembles synesthesia.... Depending on the flavors it feels, or the texture it tastes, the sucker might continue sucking, or let go."*

So while feeling is a multifaceted sense of one's own body, in the rest of this section I will concentrate mostly on the senses of touch and proprioception.

### **Feeling of Voluntary Action and Resistance**

The main theme of this paper is that sensible qualities are physical and objective and that they are produced by universal psychophysical laws while subjective awareness of those qualities is a biological and distinct fact that provides transparent access to those qualities. But my analysis of feelings seems to go against this objectivity that works so well within the visual and spatial arena. While there can be a physical objective sense of effort or strain or pressure corresponding to the physical notion of force, how can there be an objective meaning to the specific feeling of strain in my left arm? Feelings break the rule and have subjectivity that colors and sounds lack because they are always additionally qualified with reference to a specific personal body area. However, there still may be universal correlates of qualia for feelings and I will suggest that we have a direct sensation of physical force or action but it is always instantiated as a relational quality that is further qualified by it being force or action in association with a specific subjective body schema part.

**While colors and the visual represent the current state and spatial location of material particles, feelings are caused by an event: the abrupt change of a particle's state.** Feeling can therefore represent effort or force as a transition from present state  $p$  to future state  $f$ . The visual perceives "being", while feelings are connected instants of "becoming". Vision sees the manifested while feeling is of the manifesting.

To illustrate the kinds of somatosensory feelings based on force and resistance I will use three examples: the passive reception of touch from the outside in, the active proprioception of our own voluntary

movements propelling us forwards against a felt external medium, and our own felt movements in a hypothetical vacuum. In all three cases there is force and resistance.

Imagine being completely still relaxing on the couch lying on your stomach while receiving a back massage. In this case the feelings we receive are primarily of touch. We feel the pressure of the couch on our stomach and the fingers working on our back. In this example of passive touch, forces are initialized externally and resistance is our own body defending its structural integrity. The nerves in and around the skin pick up these external forces, which may penetrate deeper and be felt in our muscles and joints, and our own resistance to them is the core sensation of touch.

But in other situations we are not passive recipients but actively initiate activities. In this case we feel ourselves as one amongst other forces in nature that may compliment or oppose our own force. Nerve impulses in muscles and tendons send signals from deep within that become part of our mental body schema that is called kinesthesia, the sense of our own voluntary movement. In this scenario we are the initiators of force and feel a resistance in the external material we apply pressure to. In this case we are like the masseuse, initiating action, and we feel the pressure of the back we are working on pressing back on our fingers. All of an animal's movements throughout the world involve action and reaction, force and resistance. As we walk we push against the ground and are propelled forward by the ground's force of resistance. In swimming or flying, animals beat the water or air and the molecules of water or air resist and propel them forward. In these cases we feel the force of our own muscles acting and the touch of our skin pushing against and being resisted by the external pressure.

Imagine now that we are suspended in a vacuum moving arms and legs about in a swimming motion. We would still feel the kinesthesia of our internal muscular movements but no longer the touch of water to push against. We would just thrash about in the void with nothing to push against and therefore no propulsion and nothing to move in relation to. Yet even in this abstract case of kinaesthesia without something to touch we would still feel a sense of resistance to our efforts, for force is always directed at a resisting object. In this case the resistance comes from the mass of our own bodies, from the muscles pulling against our skeletal frame. We still need to exert energy to overcome our own physical inertial weight. This shows that at its heart force is Newtonian and works to accelerate resisting mass and when we feel opposing forces it is because they are in conflict for control of the same resisting masses.

### **Russell's Visual Monism, Relativity and the Passive**

from Russell's Analysis of Matter:

*"We may perhaps distinguish three sorts of physics, in relation to the sense-experiences from which their ideas are derived: I will call them muscular physics, touch physics, and sight physics respectively. Of course no one of them has ever existed in isolation; actual physics has always been a mixture of the three. But it will be a help in analysis to imagine a separation of each from the others, and ask ourselves which elements in actual physics belong to the first, which to the second, and which to the third. Broadly we may say that sight-physics has more and more predominated, and has achieved an almost complete victory over the others in the theory of relativity. Muscular physics is embodied in the idea of 'force.' Newton evidently thought of force as a vera causa, not as a mere term in a mathematical equation. This was*

*natural; we all know the experience of 'exerting force,' and are aware that it is connected with setting bodies in motion."*

To Russell "touch physics" leads us to infer the existence of matter which he believes has been superseded by the image of a world of monistic events unfolding in visual geometrical space according to mathematical rules. In Russells view modern physics has shown ancient feelings based physics with its belief in matter and forces to be illusory while vision based physics including relativity has predominated.

In Special Relativity the visual is certainly predominant as a "frame of reference" equates to a "point of view" which is the definition of stillness and centeredness against which all movement and measurement occurs. From any point of view or frame of reference experiments show light always moves at the same constant speed in all directions as if we observers are motionless. We experience the world visually as if we are standing still and other objects are moving. So special relativity seems to confirm as a reality our own subjective sense that we are motionless and everything moves in relation to our frame of reference or field of view. But how do we then reconcile other points of view that perceive and measure that they are motionless while we are moving?

We reconcile how each perspective objectively measures itself as motionless with light moving exactly at the same constant speed in all directions by accepting the symmetry of visual appearances so that for example distant animals appear small to us and we appear small to them. In relativity likewise we appear to be moving objects from the perspective of objects that appear to be moving to us. The visual sense and appearances are at the heart of special relativity. It is an appearance that we are standing still and other things are moving. But the visual appearance is real in relativity for the observer is always at rest and movement is only relative to one's perspective. How then can all relatively moving observers measure light moving at the same constant speed ( $c$ ) in all directions? It is because of visual appearances: if we were to see a rocketship speeding by, its spatial dimensions and shape would appear to shrink asymmetrically (greater in the direction of movement) exactly so that its occupants measure light moving at the same speed ( $c$ ) in all directions. But from the point of view of people on the spaceship it is our space that appears asymmetrically shrunken just so that we continue to measure light as moving at the constant  $c$  in all directions as if we were standing still. It is only when we try to determine some  $x,y,z$  coordinates describing an absolute space independent of any observer that we run into trouble.

Visual perspectival appearances are central to Special Relativity but General Relativity is also visually biased and is imagined as a kind of geometric bending of the shape of space around massive objects so that gravity is no longer conceived as a force but simply the natural motion of objects following curved paths in a curved space. Russell then models all of physics on relativity. In his visually based physics events unfold lawfully within the monistic four dimensional block-universe geometry of space and in this restful block universe there is no need for the ancient touch and action based concepts of force and material resistance.

I think Russell's eliminative visual monism is incomplete. Visual physics and relativity are limited to the physics of passivity. Uniform inertial motion is rest and in general relativity inertia is expanded to include the gravitational bending of spatial geometry by massive objects. The force of gravity disappears into the

mathematics of inertia. Relativity provides a monistic restful background or stage but quantum physics still contains notions based on the tactile senses with matter and forces redefined as a network of real interacting particles.

### **The Quantum of Action**

What Russell has called touch physics is resistance to force and has given rise to the idea of matter. With his abandonment of any ultimate importance to force and matter Russell developed a monism based on an unfolding block universe of psycho-physical events. How different from Newton's belief in the real "vera causa" of force and William James pluralism of real felt conflicting forces. Is there any way that the ideas in modern physics can save that Jamesian pluralism and provide validation of the living as experienced force and resistance?

I believe it can, for in the standard model of physics the world that we inhabit is still made of material masses, pointlike particles such as quarks and electrons while forces are carried by other point-like particles such as photons. Matter and force have been given a deeper meaning and yet are still fundamental. Newtonian mechanics of force that equals mass times acceleration is still true, but relativity and quantum physics provide the deeper explanations that what is really happening is quantized particle interaction. **While color is perception of the relative spatial location and state of the fundamental particles, feelings result from a sudden change of state: the quantum of action.** Force still exists and is now understood as material interaction with force carrying particles that are either absorbed or emitted when there is abrupt transition, the impulse of momentum change, a quantum change of state, and this according to our proposed UCQ generates feelings. Feelings then are proposed here to be the direct experience of the electromagnetic force in action, its particle attractions and repulsions resulting from the underlying particle absorption and emission of photons in instantaneous quantum events.

The concepts of force and matter have ancient origins. For Democritus, Epicurus and Lucretius the world was made of hard little atoms of matter that can truly be known only through "touch". For Lucretius the atoms have no color but they can be touched: *"The primary particles of matter have no colour whatsoever, neither the same colour as the objects they compose nor a different one. If you think the mind cannot lay hold of such bodies, you are quite wrong. Men who are blind from birth and have never looked on the sunlight have knowledge by touch of bodies that have never from the beginning been associated with any colour. It follows that on our minds also an image can impinge of bodies not marked by any tint. Indeed the things that we ourselves touch in pitch darkness are not felt by us as possessing any colour."* The "touch physics" of the ancients understood matter as composed of extended indestructible rocklike atoms, but in today's physics fundamental particles are pointlike bits that use forces of attraction and repulsion to generate the crystal structure and hardness experienced as a rock. While Lucretius and the atomists are examples of Russell's "touch physics", Aristotle exemplified "muscular physics". For Aristotle, a rock can be put into motion by using a felt force of "violent" effort that changes the rock's "natural" inclination to be on the earth. Although these physical theories have continuously evolved, the basic physical ideas of force, matter and inertia are still with us and still correspond intuitively with feelings of touch and action.

With Galileo, a force was theorized to be required not to move an object, but to change its velocity or direction. Rest was redefined not as standing still, but moving at a constant speed and direction. Movement in a straight line itself became a form of passivity or natural motion called inertia. Newton added the gravitational force as a part of nature, but then Einstein in his General Theory of Relativity reinterpreted the gravitational pull not as an active force but as an extension of the passive restful natural inertial motion of objects moving in curved lines in warped space. Gravity and Inertia then became united as forms of the natural way an object moves if left alone at rest and not disturbed by any forces. Not only is a force required to pick up a rock and throw it, but also there are active forces from the ground underneath that are pushing the rock up and keeping it from falling to the center of the planet. And to keep our body standing upright and not lying flat in bed requires force to counteract the natural restful motions of gravity. David Park explains General Relativity in its historic context: *“The idea of gravitational force is not part of the theory.....This is, in Aristotelian terms, its natural motion. There is not talk of forces unless one seeks to impede the motion. If I hold an apple in my hand I am blocking its natural motion and that requires a force, but if I drop the apple it experiences no force until it hits the ground.”*

In Newtonian mechanics mass is the inertial resistance to acceleration according to the famous equation  $F=MA$ . But in General Relativity an object in free fall in a gravitational field experiences no force of acceleration, but rather is equivalent to being at rest or in inertial motion. This is why objects of any mass or no mass at all (photons) fall at exactly the same rate as they are merely at rest flowing along curved spatial lines in natural motion. If gravity is inertia and not a force and a force is the momentum changing quantum impulses of particle interactions then the search for the quantum of gravity may be misguided. Says Vesselin Petkov of the Minkowski Institute in his paper “Is Gravitation Interaction or just Curved-Spacetime Geometry?": *“In general relativity, a particle, whose worldline is geodesic, is a free particle moving by inertia; therefore the motion of bodies falling toward the Earth’s surface and of planets orbiting the Sun (whose worldlines are geodesic) is inertial, i.e., interaction-free, because the very essence of inertial motion is motion which does not involve any interaction (and any exchange of energy momentum) whatsoever.”*

What is the nature of the force through which we can move a rock or feel it resisting? It is based on electromagnetism and it is understood through quantum physics as the active repulsion between the outer electrons of one’s hand and the outer electrons of the rock. According to quantum physics that force is mediated by the exchange of photons back and forth between the outer electrons of the rock and the hand. In the quantum world every change in momentum (or acceleration) is actually a sudden impulse that happens when a particle absorbs or emits a force carrying particle (the photon). So the force that is felt as action is not a continuous pressure but is made out of the discrete and sudden impulses of millions of microscopic instantaneous jumps in momentum caused by the absorption and emission of photons. But if all this energy were merely causing the particles to accelerate randomly that would be experienced as “heat” and what we are looking for is directed or purposeful motion. **The UCQ for the feeling of action can be understood then as caused by the acceleration of the millions of elementary particles in a purposeful coherent directed manner.** We feel the effort of picking up and throwing the rock when our muscles exert energy to move in a singular concentrated direction.

The tactile qualia are produced in a statistical manner as an averaging over time and space. We live in an underlying world of sudden instantaneous microscopic quantum events which cause abrupt shifts in

momentum involving fundamental particles without extension; and yet the world we experience appears to us as smooth and continuous. This is what Lockwood called the “grain problem”. Microphysics is made of extensionless bits and instantaneous events but we experience smoothness and continuity. Only in the averaging and blending of the millions of coherent quantum events and the merging of felt qualia does a purposeful directed action appear as a quality of active purpose and effort. Then we are able to sense our own limbs moving with a direction and also feel the touch or pressure when externally generated resisting forces from objects press back against the initiating body which then attempts to defend its own integrity. As we saw previously, it is the real spreading out of qualia originating in physical events and fanning out across space-time and merging with each other that can account for this experience of spatial and temporal continuity caused by an underlying substratum that is made of discrete quantum bits.

### **James and Pluralism**

William James wrote poetically about how the real world consists of real conflict between opposing forces of unequal strength and how this is directly experienced as feelings of activity. In his pluralistic worldview we feel ourselves as an active force in nature amongst other active forces which are often in conflict.

*“All the descriptions have to trace familiar outlines, and to use familiar terms. The activity is, for example, attributed either to a physical or to a mental agent, and is either aimless or directed. If directed it shows tendency. The tendency may or may not be resisted. If not, we call the activity immanent, as when a body moves in empty space by its momentum, or our thoughts wander at their own sweet will. If resistance is met, its agent complicates the situation. If now, in spite of resistance, the original tendency continues, effort makes its appearance, and along with effort, strain or squeeze. Will, in the narrower sense of the word, then comes upon the scene, whenever, along with the tendency, the strain and squeeze are sustained. But the resistance may be great enough to check the tendency, or even to reverse its path. In that case, we (if 'we' were the original agents or subjects of the tendency) are overpowered. The phenomenon turns into one of tension simply, or of necessity succumbed-to, according as the opposing power is only equal, or is superior to ourselves. ..Whosoever describes an experience in such terms as these describes an experience of activity. If the word have any meaning, it must denote what there is found. There is complete activity in its original and first intention. What it is 'known-as' is what there appears. The experiencer of such a situation possesses all that the idea contains. He feels the tendency, the obstacle, the will, the strain, the triumph, or the passive giving up, just as he feels the time, the space, the swiftness or intensity, the movement, the weight and color, the pain and pleasure, the complexity, or whatever remaining characters the situation may involve. He goes through all that ever can be imagined where activity is supposed. If we suppose activities to go on outside of our experience, it is in forms like these that we must suppose them, or else give them some other name; for the word 'activity' has no imaginable content whatever save these experiences of process, obstruction, striving, strain, or release, ultimate qualia as they are of the life given us to be known”*

Hans Jonas describes feeling as a perception of ourselves as one force within a real world of other forces. *“Reality is primarily evidenced in resistance which is an ingredient in touch-experience. For physical contact is more than geometrical contiguity: it involves impact. In other words, touch is the sense, and the only sense, in which the perception of quality is normally blended with the experience of force, which being reciprocal does not let the subject be passive; thus touch is the sense in which the original encounter with reality as reality takes place: Touch brings the reality of its object within the experience of sense in virtue of*



*that by which it exceeds mere sense, viz., the force-component in its original make-up. The percipient on his part can magnify this component by his voluntary counteraction against the affecting object. For this reason touch is the true test of reality: I can dispel every suspicion of illusion by grasping the doubtful object and trying its reality in terms of the resistance it offers to my efforts to displace it. Differentially expressed, external reality is disclosed in the same act and as one with the disclosure of my own reality-which occurs in self-action: in feeling my own reality by some sort of effort I make, I feel the reality of the world. And I make an effort in the encounter with something other than myself.”*

The felt qualia of activity can be thought of as the direct experience of force ultimately grounded in the coordination of the millions of quantum jumps that happen when particles absorb and emit photons of energy. The coherence and directedness of the quantum jumps implies downward causation, that forces may be harmonized from a higher level of organization. Then different individual instances of high level organization may compete for control of the underlying material substratum. Russell never needed to eliminate the feeling senses of muscle and force, touch and matter, for in modern physics the world does contain real material point-like particles and the force particles through which they interact. Russell's visual monism reflects only the passive aspect of the universe, the background stage of inertial mass and gravity upon which energetic interactions take place. As Jonas describes, the feeling sense uniquely reveals the self as a force interacting with material and other forces in the real world.

## **Sound and Music**

Sounds like colors, are objective in that they can be conceived of as located out in the world existing independently of any mind while potentially shared by multiple mental listeners and like colors in the absence of light, sounds in a vacuum continue to exist at the external objects even when the atmospheric medium through which they normally connect to our auditory system is absent. We think of a pain or itch as in me, at a specific bodily location. Even a taste is in me, somewhere on the tongue. But a visual object is not in the eyes, and a sound is not in the ears; they are out there in the world.

As we move in the direction of the sound it grows louder and any other mental subject at that same location could in theory share the experience of the same numerically identical sound. That is, a sound can be thought of as emanating from a spatial location and any being in that general location may hear the exact same sound. But unlike the visual sense which directly enables perception of spatial relations as part of its own unique singular field, there is no sense of spatial extension at all within the auditory sense. The closest that the auditory comes to a spatial sense is highly indirect; it is merely that moving towards its source causes sounds to grow louder and moving away fainter. So sounds are like colors in being objective, existing out in the world independent of any potential observer or listener, but unlike colors in not being spatially extended.

This is not to say that “hearing” conceived physically as the processing of sound waves contains no spatiality, but auditory phenomena limited to the sensation of sound have no spatiality. For we do seem to have some vague sense that a sound is coming from a certain direction; that is more from the left or right. But I contend that while much of this information may come in from the ears it is not part of the phenomena

of what is heard as a sound but given in another sense; a physical feeling of the direction coming from one body side rather than another. Because the bodily feelings can sense the same sound vibrations, our vague sense of sound directedness may be parasitic on the tactile and hearing may be more than sound. But as we have discussed, feelings have only a crude spatial sense of different body parts simultaneously felt but not their overall spatial relatedness in a single unified visual map. So in order to spatially locate a sound, we normally feel its general direction and then try to further locate it visually. In what has been called “visual capture”, the visual sense dominates psychologically in determining the location of events. Vision dominates because as has been discussed it is uniquely the direct sense of space. In the “rubber hand illusion” a tickling feeling may be perceived not in the arm where we have seen the same sensation our whole lives but as originating in a place where a corresponding tickling movement is “seen” right now, even when in an inanimate object. The feeling seems to be actually in that inanimate object showing just how pliable our body image actually is and how important vision is in pinpointing locations. And in the same way “the ventriloquist illusion” shows us sounds appearing to be emanating from a dummy and as long as its mouth moves in sync with those sounds, a sound will be judged as coming from a perceived logical visual source, especially if it is in the general direction of where it is physically felt to be originating.

The UCQ of sounds are unlike both colors and feelings in that while colors and feelings can be reduced to originating in the smallest quantum of elementary particles and their movements such as the vibration of an electron or the interaction of an electron with a photon, sound is meaningless at the scale of the singular particle or quantum event and only makes sense as organizational over a large number of particles and over an extended period of space-time. Specifically, sounds are generated when structures of large groups of particles vibrate in relation to each other. The UCQ of sounds are not founded on singular bits of matter but spatial and temporal relations among particle collections - the extended large scale vibrations in material structure. In other words, vision and feeling are based on UCQ that have high resolution to tiny points while the spatio-temporal resolution of sound is low and spread out.

Sounds and feelings are often complementary in that feelings of bodily movement can come prior to and seemingly generate sounds, in which case we are the force that causes the sound, and conversely sound vibrations can be felt. In living organisms feelings may be caused by purposeful activity, the coherent quantum jumps behind a directed bodily movement. Such purposeful felt activity can often lead to the large scale collective vibrations of particles that cause the generation of sounds. As the public objectification of these kinds of private inner feelings, sounds are the primary mechanism by which animals can communicate. With the possible exception of the octopus and chameleon, animals cannot voluntarily generate colors, but they often voluntarily generate sounds to express themselves either to intentionally or unwittingly signal each other. Sounds alert us to some unexpected event - something happening in the world: a lion roars, there is a thunder clap, a tree branch snaps, the wind howls, a car arrives, somebody yells, there is rustling in the woods, a crow calls. It is the sense of the life happening out there now, the individual events to which we may need to be alerted.

## Music, Pleasure and Pain

Music is organized sound. But there is much more. It is organized sound that has the power to move us, to resonate within us and eventually become a learned part of us. It seems to follow complex patterns of order that have common features and yet it is highly personal. Music is both heard objectively and felt within as interactive dancing.

Music is a vehicle for communicating emotion and feelings as it requires action and feeling to produce and to reproduce from memory. While the emotions produced by music can be varied overall and often convey sadness as well as joy, within that sadness there is still beauty and pleasure. Music is produced from pleasure and recreates pleasure in the listener. The objective senses of vision and hearing can perceive beauty and in the subjective sense of feeling that beauty translates into pleasure. Pleasure is the inner sense of beauty and beauty is objectified pleasure. Beautiful music has a complexity of organization that balances repetitive patterns and overlaying themes with unpredictable variations that challenge and captivate us requiring interaction and involvement. With physical effort a piece of music can be learned and become a part of who we are and then may become more predictable, but still may capture us with elements that continually surprise.

*“The best music is full of contradictions, contrasts, unexpected turns and finally, moments when what is anticipated is delivered in full giving a sense of release or finality, resolution.*

*The theory is that it has to do with anticipation. What makes music so pleasurable is the interplay of what you hear and what you anticipate (which is why first listenings are almost never terribly enjoyable). If you listen to the Allegretto a lot and let it sing in your head, you'll begin to hear not just the harmony provided by the composer but a million others you anticipate subconsciously.”* Bernard Chazelle

*“The longer we are denied the pattern we expect, the greater the emotional release when the pattern returns, safe and sound. That is when we get the chills...To demonstrate this psychological principle, the musicologist Leonard Meyer, in his classic book Emotion and Meaning in Music (1956), analyzed the 5th movement of Beethoven's String Quartet in C-sharp minor, Op. 131. Meyer wanted to show how music is defined by its flirtation with - but not submission to - our expectations of order. To prove his point, Meyer dissected fifty measures of Beethoven's masterpiece, showing how Beethoven begins with the clear statement of a rhythmic and harmonic pattern and then, in an intricate tonal dance, carefully avoids repeating it. What Beethoven does instead is suggest variations of the pattern. He is its evasive shadow. If E major is the tonic, Beethoven will play incomplete versions of the E major chord, always careful to avoid its straight expression. He wants to preserve an element of uncertainty in his music, making our brains beg for the one chord he refuses to give us. Beethoven saves that chord for the end.....”* Jonah Lehrer

The proposition is as follows: Beautiful music is an external organization of sounds that has the power to resonate with our own voluntary movements, and it is that internal dance that produces feelings of pleasure. So as far as the specifics of these speculative UCQ go we will define the “feeling of pleasure” as that kind of feeling quality which is produced from that dance, a state of organized internal bodily rhythm. The feeling of pleasure emanates from internal movements that have musical qualities, an internal music. The auditory sense has music and the visual has beauty, but there is no idea of beauty within feelings for pleasure is the word for beautiful feelings. Says Roger Mathew Grant: *“Perhaps we've been asking too many questions about what in music is pleasurable, and too few about how pleasure is a phenomenon with*

*musical qualities.” And from Alexander F Skutch: “Why should a complex train of atmospheric vibrations, conveying no welcome information and contributing nothing material to our welfare, delight us so powerfully as music can do? I believe we can account for this only by the fundamental principle that harmony is the source of all joy and happiness, not only in ourselves, but doubtless also in every conscious being”.*

In contrast to pleasure which we have proposed to be a kind of internal music, pain, its opposite, may then be described reciprocally as a kind of noise that disturbs and obstructs the harmonious melody of the healthy state. Pain is often perceived as an obstruction, a pressure, a tension in a specific body location and pleasure is relatively felt from a release of that tightness, a relaxation, a relief. Pleasure is energy that flows freely and playfully in circular patterns while pain energy is heavy, tight, jerky and chaotic. Pleasure involves the body working as a whole, a coordinated dance of integration and any disruption of that harmonious oneness is unpleasant.

*“The difference between the movements on the two sides of the spectrum is the presence or absence of coordination and rhythmicity. In all painful states the body's movements are uncoordinated and spasmodic; In pleasure the movements are smooth and rhythmical...Pleasure, in the form of good feeling, is the basic state of a healthy body. Pain denotes some disturbance of this basic state.” ... Alexander Lowen*

There is a global low level feeling of pleasantness in the background sense of the rhythmic harmonic directed coherent control of the day to day normal animal life..of working, walking, swimming, resting, playing, cooking, cleaning, hunting, organizing, loving, breathing. The more rare localized intense pleasures of food and sex are linked to brain mechanisms that originate pleasure vibrations in a physical location in the body schema and then spread out to bathe the organism in rhythmic waves of euphoria. These intense local pleasures can be integrated with the global diffuse pleasantness of smooth voluntary movements and timed to our liking so that we choose if, when and how to partake in them. For example, we can voluntarily integrate the intense local pleasure of eating a delicious meal with the global social pleasure of dining out with friends. We can also integrate the intense local sexual feeling in a stimulated genital body part with the holistic creative act of lovemaking with its fantasies and desires. This is pleasure at the high holistic level encapsulating pleasure in a specific body location. Pleasure always involves choice and self creation. In the act of self creation, we choose what kind of music or organized pattern of sound to incorporate into our self organization. Which music recording am I in the mood for while I lay down to listen and relax? We develop tastes for specific kinds of music as we develop tastes for specific kinds of food by resonating to it and incorporating it into ourselves. But pain is never timed to our liking. It is an externality that intrudes on us and disturbs the smooth flow of our normal activities. The relief from pain is itself perceived as pleasure and the direct sense of return to the normal healthy state. Indeed animals want not just to eat, stay warm, breed and avoid pain but they also want to continue living because living for a healthy animal is in general a state of pleasantness.

The theory promoted here is an “intrinsic quality” theory of pleasure, because pleasure is portrayed as a real sensual quality that can be directly experienced and has value in and of itself. An alternative idea is the “desire theory” of pleasure. Intuitively we want a sensation because it is pleasurable but according to “desire theory” a sensation is pleasurable only because we desire it. In other words the sensation of chocolate on our tongue is pleasurable because while it is happening we desire to hold onto it, continue it, enhance it, enlarge it, while a pain sensation is that sensation associated with an opposite desire to reduce

it, eliminate it, escape from it. According to the “desire theory” sensual pleasure can be reduced to, or is nothing but that sensation that we try to maintain or increase and pain that sensation that we try to eliminate or reduce. While this may be partially true it can't be the whole story, for why negate the common sense of the intrinsic pleasurable value of the local feeling? We can re-interpret the desire theory and the intrinsic quality theory as complementary rather than in opposition. The main problem that the desire theory aims to solve is the “heterogeneity problem” which puzzles over how diverse feelings such as the taste of chocolate and the love of music, two experiences with nothing in common, can both give rise to pleasure. Pleasure then must be external to the sensation itself, an attitude of motivation to enhance it. But that approach appears to be entirely top-down; I like the taste of chocolate or a particular kind of music only because I choose to. Without denying that I like chocolate because I choose to, we can say that the taste of rich sweet creamy chocolate also has a bottom-up effect, a power to pull us into it, and also that good music has a power to potentially engage that bad music does not.

Philosopher Chris Heathwood advocates a “desire only” theory of pleasure but identifies a problem with it when trying to extend it to pain; that it cannot differentiate painful sensations from merely unpleasant ones. He asks: “*What distinguishes an unpleasant sensation that is also painful from one that is not?*” In other words pain seems to be a subset of unpleasant or uncomfortable sensations since painful sensations are always uncomfortable but unpleasant sensations are not always painful. I will venture that an unpleasant or uncomfortable feeling is holistic and is felt at the larger scale as an unwanted activity such as experienced in restless legs or asthmatic breathing, while pain is a particular disorganization emanating from micro disturbances at specific body locations. Discomfort involves unwanted global, jerky, uncoordinated and panicky movements while pains are chaotic movements at a local level that spread outward and then create global discomfort. An unpleasant sensation of pressure in the bladder may not be painful but may cause a more global squirming until urination releases the pressure in pleasant relaxation. The discomfort is the high level disorganization and chaos associated with escape, a restless anxiety which may exist independently from or be produced in response to local sensations. But some sensations such as an intestinal cramp or toothache or bee sting appear to be inherently painful and presumably are caused by chaotic movements at the location of the pain in the body schema. But it is the same with pleasure. The holistic pleasant victory dance of celebrating your sports team winning occurs independently of any specific localized pleasurable sensation, but also intense local pleasurable feeling sensations such as the taste of delicious food may cause a global celebration of rapture.

Returning then to the main theory here of the universal correlates of qualia (UCQ); pain existed physically in nature before brains ever evolved. Brains had no power to invent pain de novo, but their evolution merely made use of an already existing sensation that because it represents disorder to a mental being is intrinsically disharmonious with any of its possible strivings and pleasant movements. Our unique personalities may be equated to a song, a musical score, and pain is a noise that disrupts that score. The brain evolved to employ pain as a vehicle for communicating from a body part to consciousness the information that there is a local disordered state of injury requiring our cautious attention. So pleasure is the feeling of organized movement that we can choose to make part of ourselves as per our own personal tastes in self-creation, while pain emanates from disorganized chaotic movement that would be destructive to any kind of positive organic activity.

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