Dissertation Manuscript

Visual Scientific Modelling –

A Visual Hypothesis for the Nature of Consciousness

& The Evolution of Conscious Awareness.

By Kai Wayne Holland BA

This dissertation has been researched and developed by Kai Wayne Holland for submission in line with the dissertation component of the Mres (Master by Research) Degree Program in Art & Design at UWTSD Swansea and within the greater Wales Institute of Science & Art in the academic year 2021/22.

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DECLARATION
This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Signed.....Kai Wayne Holland..... (candidate)

Date .....21/09/2022.....

STATEMENT 1
This thesis is the result of my own investigations, except where otherwise stated. Where correction services have been used the extent and nature of the correction is clearly marked in a footnote(s). Other sources are acknowledged by footnotes giving explicit references. A bibliography is appended.

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STATEMENT 2

I hereby give consent for my thesis, if accepted, to be available for deposit in the University's digital repository**.**

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Contents

Gesamtkunstwerk:

> A Gesamtkunstwerk, literally "total artwork", frequently translated as "total work of art", "ideal work of art", "universal artwork", "synthesis of the arts", "comprehensive artwork", or "all-embracing art form" is a work of art that makes use of all or many art forms or strives to do so (Wikipedia, N.d).

Foreword:

> A model of consciousness is a theoretical description that relates brain properties of consciousness (e.g., fast irregular electrical activity, widespread brain activation) to phenomenal properties of consciousness (e.g., Qualia, a first-person perspective, the unity of a conscious scene). Because of the diverse nature of these properties (Seth et al. 2005) useful models can be either mathematical/logical or verbal/conceptual. (Scholarpedia, n.d)

In relation to this explanation for “useful models of consciousness” this dissertation will aim to explain the creative development of a prototype visual scientific model of the conscious experience of the observer and suggest its relevance and then possible usefulness in explaining and making tangible this abstract phenomenon of consciousness (Scholarpedia, n.d.).

The “Conscious experience of the observer” is suggested to be so defined as the entirety of any given human beings’ life, from birth to death, it is defined in an attempt to quantify the physics principles at play in facilitating that conscious experience of life as an observer for any given one of us between these key points in our human conscious experience and our timeline of life in this universe, as a product of the universe on Planet Earth.

Through the use of visual problem solving, creative thinking, visual communication practice, using basic diagrammatic graphic design tools and a vast literature review process, it will then be shown that a visual model of the conscious experience of the observer could potentially be useful in creating an informed

visual hypothesis for the nature of consciousness itself. It will be shown how the creative and collaborative creative process was fundamental in attaining what is possibly now a useful visual, conceptual, higher-order theory of consciousness as attention to memory which operates primarily on understandings derived directly from the Penrose interpretation and other competing models of consciousness and their predictions and models of understanding. (Scholarpedia, n.d). therefore, it is wise to have an understanding of models of consciousness and the topics of discussion before engaging in this reading.

It will also be shown how the hypothesis for applying understandings through quantum mechanics, relativity, the Penrose interpretation of consciousness and the new definition of Endoquantum Mechanics have come to form what can only be described as a potential unified field theory of everything we could ever come to know and remember throughout our conscious experience as observers (Kaku, 2020) Further it will be shown how this would not have been possible without the creative thinking, collaborative and visual problem solving processes through the development of basic visual and logical scientific diagrams through simple graphic design tools.

Introduction to Research.

There are many mysteries of this existence that we may never solve (Cain, 2015). There are questions that are as old as time itself that will remain unanswered. Some important questions will never be asked. Some important tasks will never be completed. Some important messages will never arrive. The varying circumstantial aspects of probabilities we face as planners for our prospective futures can be considered as the entropy that we face in everyday life (Marinescu and Marinescu, 2012) (Smolin, 2019).

We cannot see the future. But it is a natural facet of everything we do that we accept that the future will come. While most of us may not be able to directly see what the future holds in a grand scheme, we do anticipate it and, we accept that it is there and inevitable in waiting for us all. If we can't reason from our basic senses, we can deduct from data sets what may happen within a week or so, or a day or two. For instance, we know from experience that the sun is as reliable at going down in the night as it is at dawning on new days. We know certain pressure shifts in the atmosphere cause temperatures to plummet in certain areas within weather systems and with observation of data sets we can reasonably predict these quite well through modelling (Stone, 2014). So, the future and certain facts about the future can easily be imagined and can also be predicted.

This quest for truth and the quest for knowledge through the modern scientific method is the driving force of contemporary science and life on planet earth and importantly, this research project. It has been the fuel for the fire of modern humanity in building civilisation as we know it (Kaku, 2021). Science and the technological advancements from new understandings can be considered a deeply human function now and one that makes us estimate the potentials of planets in other solar systems based on how we have developed here and in light of what we know as a species to adapt and apply

to our workings within our own biosphere (Creighton, 2016). The quest is unending with every new truth unravelling new worlds for consideration and through the processes of basic trial and error the contemporary Planet Earth keeps spinning forwards with a civilisation based on a fortified foundation of developing sciences that accelerates in engineering ability and environmental impact exponentially as the time passes (Lidicker, 2020).

This study serves to extend the researcher's practice as a graphic designer into a focused investigation of the visual tools and aids used by scientists to convey ideas about natural cosmic phenomena. The research is built upon the understanding that observation and recording of phenomena with visual representations is fundamental to aspects of both science and art (Kelly, 2016).

This research proposes simple diagrams and the diagrammatic process as a speculative method to visualise immaterial and abstract scientific concepts such as "The Quantum Mind." Also, what has been discovered, developed and defined as "Endo-Quantum Mechanics." which refers to all quantum mechanical processes and systems which operate through our anatomical biology and is further proposed as "the seat of consciousness." throughout our conscious experience as observers.

Through this dissertation process it will be shown that this task was undertaken through an academic literature review and deeper learning through the application of complex science theory and visual thinking to visual problem solving as a process of learning and imparting knowledge in physics through contemporary graphic design solutions and visual communication tools.

This dissertation will breakdown the theoretical basis for the prototype visual models of the conscious experience of the observer. It will show how this research project

and creative tasks were based on the study of two observations through the academic lens: 1) The experience of an anomaly in the researcher's own autistic memory function. 2) The teachings, research, understandings and ideas of some of the greatest scientific minds in history to have ever considered the topic of consciousness through the scientific and academic research lenses.

This research process is a fundamental research endeavour, meaning, it is undertaken for the aim of achieving pure understanding. The nature of "the conscious experience" (Penrose, 1989, 1996, 2007, 2014) if quantified correctly through these methods, might serve to help understand what consciousness is and how our consciousness operates. This framework of theory as a result of the creative process after this fundamental research journey will serve as a prototype visual model which, throughout the creative process, has come to continually challenge, inform and educate the researcher throughout this field of study and application of creative problem solving.

This research project will most importantly be a validation of the role of the designer and the function of visual design and visual thinking in scientific practice and scientific and theoretical communication in the realms professional and academic sciences and graphic design. It will also justify the place of creativity and imagination in the process of solving problems (Petrov, 2021). Having used these methodologies, the writing will now explore those methodologies of the process-based learning.

Chapter 1 - Methodologies

This learning journey truly began 8 years ago, shortly after the researcher was hospitalised for mental health difficulty and diagnosed with a psycho-traumatic dissociative amnesia disorder and a resulting psychosis from the ensuing PTSD and what has clearly been a lifelong autism spectrum disorder.

Part of the method for this partially autoethnographic approach to the research was then to fully apply one's mind through critical thinking, application of logic and reason and imagination but to also to attempt to conduct oneself through the scientific method of enquiry with appropriate applications of scepticism and Cartesian Doubt. This was planned so that an attempt of deliberating truth from the models could be made. (Descartes, 1637)

> For to be possessed of a vigorous mind is not enough; the prime requisite is rightly to apply it. The greatest minds as they are capable of the highest excellencies, are open likewise to the great aberrations; and those who travel very slowly may yet make far greater progress, provided they keep to the straight road, than those while they run, forsake it. – Rene Descartes (Descartes, 1637)

The practical and theoretical methodology of this research project has been progressive and an educational learning and creative process. It has been a process of evaluating the works of key minds and writers through their books and primary resource literature and further, the creations from their work as professional and academic researchers, scientists and visual communicators. It has been an exploration into peer reviewed journal science and the worlds of visual communication in science education and visually communicative graphic design practice.

The bulk of this learning has been done manually through the reading process and with this knowledge base being applied visually in the prototype models and hypotheses

through contemporary graphic design processes. The researcher would then use the developing diagrams and the development of their functionality as communicative modes more as they learned through the reading process. This is practice-based research meaning that it is located within the practice of visual diagramming and the direct use of semiotic symbols, which in turn sits within Graphic Design as a discipline. The practice performs a processual dynamic in the research. That is to say that it is driven by a process of uncovering understanding (primarily that of the researcher), and any visual or theoretical outcomes are secondary to this basic and fundamental research process.

These simple graphic design processes began with basic linear and system based diagrammatic drawings where design decisions were based on a foundation of relevant research and the application of critical theory through logic and reason for what these diagrams represent. These visual components grew in their weight as the researcher came to understand more and more about the functions of the systems that the work was portraying. It was a fluid learning process and a diverse learning pool whereby new understandings from the questions which were presenting themselves helped shape and construct the understandings that come to be visually presented as hypotheses in the final prototype visual models. It was a continual process of discovery and then experimentation. One of trial and error and of consistent development and openness to change of direction and presentations of new information or new understandings. The method of creation was then fluid and immersive through the graphic design process and completely enlightening. There were times of euphoria for the researcher and grandiosity and through relevant readings and consistent mindful application of consistent philosophical paradigms set out for us by some of the greatest minds in history, the researcher was able to remain planted and to “keep to the straight road” with the

immensity of the workload that was required across such a long time frame and to arrive at a point of appropriate presentation with these ideas.

The final simplicity of the infographic style of the models seemed logical and natural given the complexity of the ideas that needed to be communicated and the component development process naturally lead into the development of the infographics. The components reside as the mechanics for the first quantification of the human conscious experience through art and design processes and research methodologies.

The research has been low risk as, as of yet, there hasn't been a necessity to involve any direct participants in any kind of study or questionnaire processes. There is also low to no ethical risk posed by the research or the findings they could lead to.

A substantial part of the drive through this research is to develop these models to a prototype standard. Collectively the project and resulting prototype models, through the nature of the practice-based process of methodology and use of philosophy through the development of the visuals applied can be considered as potential evidence for the greater potentials of graphic designers and artists in the field of visual communication in science. This overall collective method may also validate the place of creativity and imagination in the scientific process for establishing understanding as much as the place of visual communication in disseminating those truths and teaching them to each other and our aspiring younger generations.

As stated in the initial proposal the purpose of this research was twofold. Firstly, to consider the design of scientific models through the exploration of case studies and relevant literature and secondly to develop a prototype model/s, with a particular interest in the representation of complex abstract ideas: Namely, the science of consciousness.

Efforts for the practice through graphic design have been made to establish a definition of endoquantum mechanics, and its links to the works of Penrose and Hameroff in explaining the role quantum microtubules play in processing qualia of any given conscious seen scene.

Having now explained the use of a practice-based learning process through the chosen methodologies for this research the researcher will now highlight and explain the process of literature review which has also been relied on throughout the development of this research project.

Chapter 2 - Literature Review

This literature review section will explore in depth the primary and secondary written works of three key individual thinkers, philosophers and writers. Also, relevant article texts and publications to explain how they have helped build the theoretical framework, scientific methodology and practical approach applied later through this research project to attempt to visually hypothesise the nature of, and, visually model the conscious experience of the observer. Also, the attempt made, through this writing creative processual means of developing visual hypothesis for pure understanding, at a clear definition of Endoquantum Mechanics.

These key individuals are namely Sir Roger Penrose & Stuart Hameroff and further Rene Descartes. This section will also explore primary and secondary sources of their literature and references pertaining to their visually communicative disseminations of their understandings through their scientific research.

Penrose

First, it makes sense to examine the primary and secondary resources of Sir Roger Penrose. Penrose won the 2021 Nobel Prize for his work on the interior workings of black holes during the 1960's. He is world renowned for the development and dissemination of vastly complex ideas and his esoteric understanding in the physics and mathematics communities of Earth. He is a physicist, a philosopher, a biologist and a mathematician. He is keenly a researcher and a successful author based at Oxford University.

In 1989 Penrose published his book *The Emperor's New Mind*. Throughout this book there are equations, and graphical abstracts galore as he asserts his standing points

as a physicist and mathematician towards the issues facing scientists when approaching the task of developing understanding of the workings of the human mind, and the operations of consciousness and physics in facilitating a "conscious experience". Throughout the first section of the book, he argues against the use of the computational analogy for the processes of conscious operation with well-considered explanations and thought experiments that are delivered to the lay reader and professional research audience with intellectual finesse.

He executes brilliant deductions of reason regarding Turing machines and the Turing test that are still relevant now. He argues that human consciousness is non-algorithmic (Penrose & Gardener, 1989) and incapable of being modelled by a Turing machine-type of digital computer. His hypothesis, (which is now backed up by a number of well referenced and peer reviewed research papers with Stuart Hameroff), is that quantum mechanics plays a fundamental role in the understanding of human consciousness. This book led to the later books by Penrose and the primary resources studied through the peer reviewed journal publications in which Penrose and Hameroff have broken down the understandings that the quantum wave function collapse plays an integral role in brain wave function through the operations of quantum microtubules that reside within the cells of neurons and therefore this reading is arguably reliable in explaining and understanding the rise of the phenomena of human consciousness within the brain and throughout our biology (Hameroff & Penrose, 1996).

As you might expect a large portion of these books and secondary resource texts is spent comparing and contrasting a cavalcade of interrelated historical research discourse surrounding topics of mathematics and reality, Newtonian physics, entropy, Einstein's relativity, quantum magic, quantum mystery, cosmology and the arrow of time and

philosophy and their relation to the conscious experience. He also heavily hints towards what he perceives to be the limitations of mathematics (Penrose & Gardener, 1989).

In this book, Penrose uses these contrasts and comparisons to explain how each has a link or bearing on his developing narrative: “Consciousness is non-algorithmic.” (Penrose & Gardener, 1989). He embarks on rebuking claims of artificial intelligence using the basic computing theory and thought experiments. He argues that the present function of computing is explainable through modes of classical mechanics more so than the unpredictable modes of quantum mechanics (Penrose & Gardener, 1989). That being said, he openly admits that his general thesis through the books and his primary resources is generally rebuked by experts in the fields of computer science and robotics and in light of current developments with machine learning and applications of AI in all realms of human development, some these arguments against his ideas could still be considered relevant. In his concluding pages, Penrose wonders how firing neurons generate experience. He resonates on the assertion that quantum physics might be necessary to understand consciousness (Volk, 2018)

Throughout a number of peer reviewed journal publications he then describes and demonstrates explanations through ORCH and OR theory which are heavily surrounding the nature of quantum microtubules in the neurons of the brain and their role in brain function and fundamentally, the orchestrated objective reduction or quantum wave function collapse, with this process as the seat of the conscious experience in the brain and operations of consciousness and further, the facilitation of the conscious experience in the brain (Hameroff & Penrose, 1996). Also, there has been counterclaims or formal scientific rebukes to ORCH or OR Theory through other peer reviewed journal publications (Reimers, et al.,2014), but this was a string of arguments which was then replied to within the further peer reviewed journal publications by Penrose and Hameroff (Hameroff & Penrose, 2014).

Regardless of this ensuing debate, as already stated, since this book in 1989 there have been other books which support this quantum theory of mind put forward e.g. The Shadow of The Mind (Penrose, 2005), and now well referenced peer reviewed journal publications by Penrose and Hameroff (Schiffer, 2019). Additionally, he has received acceptance for this line of theory within Oxford University's Models of Consciousness Conference (Kleiner, 2019) which was a conglomerate conference for all of the competing theories in Mathematical Consciousness Science. Penrose's Lecture (OMCAN, 2019) during the event was seminal. Echoing his explanations through ORCH and OR surrounding the nature of quantum microtubules which operate within the neurons of the brain and their role in the orchestrated objective reduction of quantum wave function collapse as the seat of the conscious experience and operations of consciousness in the brain (Hameroff & Penrose, 1996).

As well as these emergent physics principles in the hypothesis put forward for ORCH OR Theory, this Penrose Interpretation is also incumbent of molecular biology, neuroscience, pharmacology, philosophy, quantum information theory and further, quantum gravity (Paulson, 2017).

> Objective Reduction" refers to Penrose's ideas about quantum gravity—how superposition applies to different spacetime geometries—which he regards as a still undiscovered theory in physics. All of this is an impossibly ambitious theory that draws on Penrose's thinking about the deep structure of the universe, from quantum mechanics to relativity. As Smolin has said, "All Roger's thoughts are connected ... twistor theory, his philosophical thinking, his ideas about quantum mechanics, his ideas about the brain and the mind. (Paulson, 2017).

This emergent and developing complex idea and understanding provides, in part, the theoretical basis for this research and prototype visual model of the conscious experience of the observer with a direct explanation for the seat of conscious operation to be found in the realms of quantum mechanics (Hameroff & Penrose, 1996). These understandings are

accepted as relevant and further applied to the theoretical framework and practical reflections with the prototype visual model of the conscious experience of the observer and crucially relevant for the proper definition of Endoquantum Mechanics through the visual model that was developed by the researcher and explained further on through this dissertation.

It's important to illustrate that for this research project this,

> "impossibly ambitious theory that draws on Penrose's thinking about the deep structure of the universe, from quantum mechanics to relativity." (Paulson, 2017).

is considered to be not so impossible. Professor Michio Kaku at City College of New York says, "What were once considered impossible theories are now just engineering problems!" (Kaku, 2018) and this is a driving factor through the design process for communicating these ideas visually as hypothesis. Penrose can be quoted as saying that "New physics is needed" (Penrose, 2014). His research projects and visual reflections are a bid on the same ambitious route to what is clearly defined as a potentially new area of understanding for the conscious experience of the observer. (Petrov, 2021).

It is also then a new understanding or idea for the functions, place and value of design and the design process with visual thinking in utilising scientific knowledge and research and then communicating that knowledge to an audience through an informed and innovative visual hypothesis (Petrov, 2021). This is the very nature of Penrose's presentations and lectures whereby he uses simple diagrammatic and logical models for communicating his ideas to a wider audience.

Penrose & Hameroff

Throughout an article named *Can quantum physics explain consciousness? One scientist thinks it might.* published in Discover Magazine which is rated as "High Pro Science factual reporting" on MediaBiasFactCheck.com, (medibiasfactcheck.com, n.d,) the peer reviewed publications and collaborative working relationship between Sir Roger Penrose and Dr Stuart Hameroff began when Hameroff read The Emperor's New Mind. Hameroff had been working with the science of microtubules long before this point and had proven that microtubules are in fact a ubiquitous base structure in all life on earth and in the makeup of the universe, whereby in human biology at least they act as conveyer belts and vectors for travelling biological information through communicative cells (Volk, 2018).

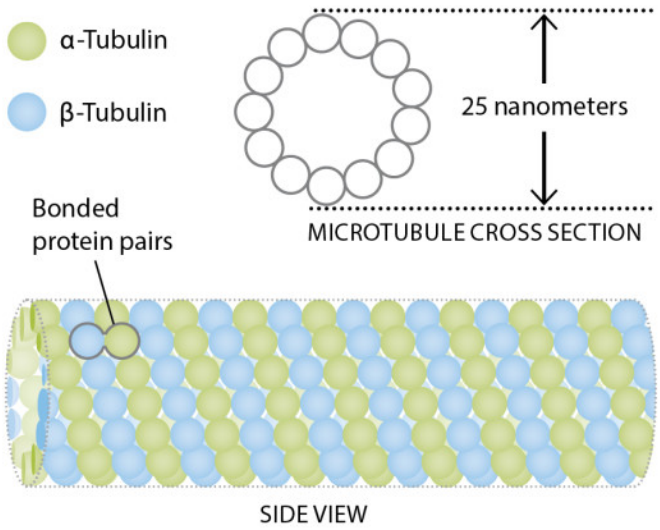


Fig 1: This image is a visual representation and diagram for the cylindrical structures of Quantum Microtubules which are made up of two types of protein which are so called alpha and beta proteins which bond together into single units which are an assembling of chains which form the microtubule. They are found in every plant and animal cell and serve a variety of purposes from creating support structures to acting as conveyor belts and as suggested by Penrose & Hameroff, possibly the seat of consciousness. (Volk, 2018)

Further: This image is a fine example of how abstract ideas like a quantum microtubule can be used for clearer and more efficient communication for imparting knowledge in a manner

that would make this idea tangible to an audience with visual representations or visual models of the phenomena.

(Credit: Alison Mackey/Discover)

Although Hameroff is consistently challenged on his emergent speculative theories by physicists, this article explains that Penrose's & Hameroff's predictions for microtubules within the neurons of the brain (Penrose & Hameroff, 1996) were actually scientifically proven in replicable tests. The results of which have been published in peer reviewed journal publications by two more recent and independent research projects which have both hat tipped Penrose and Hameroff for their accuracy so early on with their research and study (Volk, 2018).

The first by Anirban Bandyopadhyay. Anirban broke down his research outcomes in a talk at Hameroff's 2016 Science of Consciousness conference, a research task that was completed while leading his own research group at the National Institute for Materials Science (NIMS) in Japan (Volk, 2018).

> "Anirban is careful to distance himself from Hameroff's larger theory of consciousness. "This is not my concern," he says. Still, he describes Hameroff as a father to his own research. "This man was talking about microtubules back in 1982," he says. "Just thinking about them, unable to study them as I have, he *knew*, and so far ahead of everyone else. I wondered, 'What kind of brain has he got?'" (Volk, 2018)

Jack Tuszynski is the second, far more experienced scientist and researcher working with the science of microtubules and achieving extraordinary results. He is a biophysicist at the University of Alberta. A strong supporter and collaborator of Hameroff's who researches and creates medications for cancer patients (Volk, 2018) His current outcomes illustrate that microtubules have surprising conductive properties, (Volk, 2018).

> they could also be what are called “memristors.” The memristor is the much sought-after fourth element in an electrical circuit, first theorized by Leon Chua, an electrical engineer at the University of California, Berkeley. (Volk, 2018)
>
> Chua spotted something obvious. The three existing circuit elements — resistor, capacitor and inductor — depend on relationships between pairs that control how electricity flows, how it gets stored and how it changes as it moves through a circuit: (Volk, 2018)
>
> Chua’s equations suggested that a memristor’s electrical resistance, or conductivity, would not be constant, like a lightbulb’s, but dynamic, and determined by the history of the current that had flowed through the device. (Volk, 2018)

These findings and their coherence with Penrose and Hameroff in their developing models explaining how microtubules could be the seat of consciousness is quite remarkable. Although, both researchers stray away from Hameroff’s emergent speculative theories, they largely agree with the existence of the microtubules within the neurons of the brain and they largely agree with the position taken that these microtubules have an important function within the workings of the neuron, even so far as explaining that these microtubules may even be “Memresistors” which would essentially start to explain how neurons help us to remember and process memories for storage and recall and maybe how we process thoughts or the information of any given scene of awareness. (Volk, 2018).

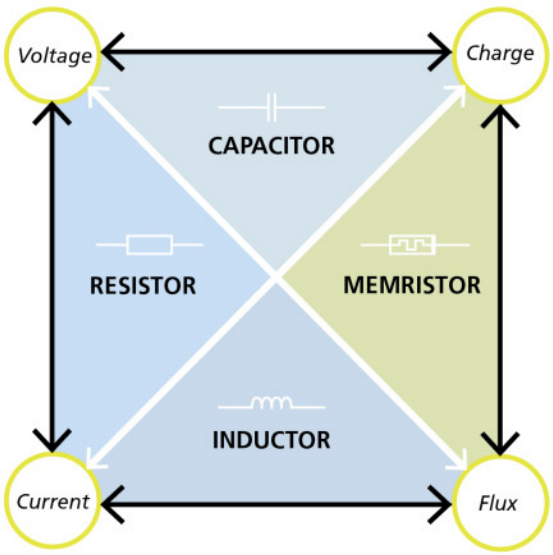


Fig 2: all electrical circuits are built up on four fundamental variables – current, voltage, charge and magnetic-flux linkage. The relationships between these fundamental variables can be attributed to the classic components of a circuit – the resistor, the capacitor and the inductor with the exception of one pairing: Charge & Flux. It is theorised that the memresistor could fill this gap creating a fourth fundamental circuit element that would operate like a resistor with memory. (Volk, 2018)

Further: This image is another brilliant example for how visual communication can be used to process ideas and communicate scientific knowledge or even abstract ideas in a tangible manner to a target audience.

(Credit: Alison Mackey/Discover)

> Of course, none of this is to say that Hameroff wins this debate. He has yet to reframe fringe as frontier, and he may never. But in this moment, with scientific success being in part a simple function of math — is an idea gaining or losing adherents? — he is clearly on the way up, (Volk, 2018).

These findings, and, their ultimate coherence with Penrose & Hameroff's predictions is emergent and still considered as fringe science. (Volk, 2018). However, the results from these two researchers and their work are indicative of great theory work having been done by Penrose & Hameroff in a time when this more advanced scientific research was not an option. It is clear that these researchers have engaged with the primary research resources offered in the publications of peer reviewed journal papers and this is very promising for this research project (Volk, 2018).

It is surmised from this review of the primary and secondary resources that microtubules are a facet of a growing field currently referred to as "Quantum Biology." (Volk, 2018). Further through this research project the researcher aims to link this idea of quantum biology with the resulting discovery of the possible definition of "Endoquantum Mechanics." as they offer a clear route for understanding and communicating that quantum systems operate "within" biological systems and can be observed without changing the system through the act of observation. This could then theoretically lead to "a Perfectly self-

observing system." Which is what the researcher is claiming about the resulting visual outcomes of this research project (Penrose & Hameroff, 1996).

This is largely incoherent with the responses to Penrose and Hameroff from the more classically thinking physicist community, which were in line with Copenhagen Interpretation which explains that human biology is "too warm and wet for quantum effects to have any place" (Volk, 2018).

It is clear to the researcher that in light of this new and exciting research, the Copenhagen Interpretation may soon be required to change, or, in terms of researching, explaining and considering this emergent consciousness science, and its relation to the development of the visual hypothesis in this research project, and the discovery of endoquantum mechanics, possibly completely relegated (Volk, 2018).

Descartes

Best known for his most philosophically influential quote "I think, therefore, I am." (Descartes, 1637) Rene Descartes was this first modern philosopher and a world changing pioneer in epistemological thinking through the sciences. His writing and his method for conducting reason in the sciences and his meditations of first philosophy have shaped the development of logic and rational deduction for establishing truths across the board of academic and professional sciences for the last four hundred years (Langley, 2015).

This writing will focus on the scientific method developed by Descartes after famously reflecting on the dreams he had on the night of the 10th November 1619. One of the key areas of focus in context of this research are his four criteria for deliberating truth's which have become the basis of the modern scientific method. The visual representations and explanations that will be developed for the visual reflections of this

research project will be drawn and amalgamated in their form as visual models and hypothesis of scientific phenomena which have been developed through these criteria for the scientific method and referring the outcomes to the research through Penrose and & Hameroff's writings. These four age old stipulations or rules for directing one's mind through observation are still heavily relied upon in classrooms worldwide. Descartes defines this "Method" as a set of

> reliable rules which are easy to apply, and such that if one follows them exactly, one will never take what is false to be true or fruitlessly expend one's mental efforts, but will gradually and constantly increase one's knowledge till one arrives at a true understanding of everything within one's capacity. (Plato.Stanford.edu, 2020).

In context of this research project, this method and the famous four criteria are applied to the gathering of the information and development of the ideas presented in the resulting prototype visual models. This gradual increase in knowledge has been evident in the processual learning from developing the prototype models and then drawing reference and context from research like that of Penrose and Hameroff. The four main criteria can be explained and translated in the following…

> Instead of the great number of precepts of which Logic is composed, I believed that I should find the four which I shall state quite sufficient, provided that I adhered to a firm and constant resolve never on any single occasion to fail in their observance.
>
> ***1.*** **Doubt everything.**
> The first of these was to accept nothing as true which I did not clearly recognize to be so: that is to say, carefully to avoid haste and prejudice in judgments, and to accept in them nothing more than what was presented to my mind so clearly and distinctly that I could have no occasion to doubt it.
>
> ***2.*** **Break every problem into smaller parts.**
> The second was to divide up each of the difficulties which I examined into as many parts as possible, and as seemed requisite in order that it might be resolved in the best manner possible.

> ***3.*** **Solve the simplest problems first.**
> The third was to carry on my reflections in due order, commencing with objects that were the most simple and easy to understand, in order to rise little by little, or by degrees, to knowledge of the most complex, assuming an order, even if a fictitious one, among those which do not follow a natural sequence relatively to one another.
>
> ***4.*** **Be thorough.**
> The last was in all cases to make enumerations so complete and reviews so general that I should be certain of having omitted nothing. (Rehfeldt, n.d.)

By following this set of rules through the gathering of information through the literature review for presentation in the practical developments for the visual prototype models the researcher will be able to adequately assert facts for the understanding presented in the visual hypotheses (Petrov, 2021). The researcher would argue that this use of critical theory, and the critical thinking approach would give the creative design process and outcomes an unquestionable scientific quality (Petrov, 2021). This will in turn be mechanistic in presenting and proposing the prototype visual models and their theoretical frameworks as the basis of further study and further development through this informative and processual learning journey.

Cartesian Dualism/Duality

In light of these criteria it is vital to highlight at this point that an aspect of Cartesian reasoning that will be directly confronted and built upon is the function of the concept of dualism or duality in our perceptions of reality (Duignan,2020). This subject is a hub for debate in contemporary scientific research fields. The visual model and hypothesis for the conscious experience of the observer will build on and adjust the philosophical approach to dualism in light of new research, understandings and knowledge (Dualism (Stanford Encyclopaedia of philosophy), 2021)

Through research it is clear that what was once “Dualism” is the same system we understand but now explain as a synchronistic data processing system that is the mind-body relationship (Duignan, 2020). This building on dualism or duality is further echoed through modern biology and academic philosophical discourse (Mayer & Saper, 2000). For instance, it is relevant in biology and neurology and areas of memory psychology science when we speak about the “Brain-eye Response” (Mayer & Saper, 2000). These relationships are accepted and built upon further in the visual response to this research project. There is an integral role of this concept of dualism or duality within the visual hypothesis for the mechanics that are proposed for the new understanding of the operation of the conscious experience of the observer and how Endoquantum mechanics may explain this dual process of physically perceiving any given scene and psychically processing and rendering the scene as an “image” in the brain (Petrov, 2021).

Visual Communication in The Sciences.

Throughout this section of the dissertation the writing will explore a number of key primary resources through journal publications in relation to visual communication and its place within the sciences. There is a growing global and cultural understanding for the reliance on and potential of visual imagery in communicating science. First, we have to talk about the case for graphic design thinking.

> The history of epistemology is linked to the history of modes of communication, and this in turn is intimately tied to the development of textual organization, typographic and diagrammatic representation. Modes of thought and the way we acquire and share knowledge are shown to exist in symbiosis with technological development. (Gillieson and Garneau, 2018)

This article *A Case for Graphic Design Thinking*, links the history of key aspects of visual communication to those of the history of epistemology. This article argues that our processes of communication and overall design thinking for developing technology through the sciences are symbiotic, coexistent, and co-dependent. In defining this mode of thinking, the article cross examines similarities between academic research in design, humanities and the sciences. The conclusion of this mode of thinking is said within the article to imply action in that it is synthetic, generative and conscious of the future. The article examines seven key characteristics linked to this graphic design thinking and highlights a world of potential for this kind of thinking to be used as a tool of practical and ethical engagement (Gillieson and Garneau, 2018).

Another article that explores links between visual communication, design thinking, and the sciences is *The Role of Ethics Culture, and Artistry in Scientific Illustration* (Ross, 2017). Throughout this article it is theorized through a visual model of cultural interplay and scientific illustration, about the creation of scientific knowledge. This is extremely relevant in the context of this research project with considerations for the potentials as a contribution to knowledge. The article debates further that scientific illustrations work as epistemological devices because they are culturally mediated creations attached with personal organizational and disciplinary trust. These are then shaped by the prevailing worldviews (Ross, 2017).

Further, the article *Picturing Science: Design Patterns in Graphical Abstracts (GA's)*

> A graphical abstract (GA) provides a concise visual summary of a scientific contribution. GAs are increasingly required by journals to help make scientific publications more accessible to readers (Hullman and Bach, 2018).

The GA's defined here are coherent and cohesive with the planned approach to visualising the prototype visual models and hypotheses. This article shows how visual aspects of journals and publications can be used to create more engagement from the audience. This will help in proliferating any new understandings from any new developments with visual scientific modelling. Reflections on the metaphorical and representational genres that pertain to prior characterisations of how diagrams communicate this study shines a light on how Graphical Abstracts or GA's may be unique and distinct (Hullman and Bach, 2018).

There is a clear culture of GA's being used fluidly through scientific research and this research adds value to that culture in a number of key ways. Firstly, we know the development of the hypothesis through this processual learning and visual problem-solving process is, in terms of this research process, quite valid as a mode of learning and imparting knowledge through visual language, signs, symbols, diagrams and models. Secondly, the researcher would then say that this validates the role of the graphic designer within that culture along with showing the true value of graphic design. Thirdly, the visual thinking process throughout this project directly led the suggested definition of endoquantum mechanics and this then adds fuel to the fires of those already in the field of study and research in science and their hopes of conveying their ideas to appropriate target audiences using simple and basic visual design solutions or even making discoveries.

In the *article Fundamentals of Graphic Design – Essential Tools for Effective Visual Science Communication* the authors talk about the role of design.

> "The role of graphic design is communication (Barnard 2005); thus, it should be intuitive to seek knowledge from professionals in the field" (Murchie and Diomede, 2020)

This section justifies the researcher's aims to validate the prototype visual models and hypotheses through professional outreach to appropriate professionals, academics and researchers within the relevant fields of enquiry. There is also the hope of adding credence to their own professionalism as a researcher and applied creative in STEM topics. The article argues that daily life is a race or competition to gain people's attention in a sea of information. This argument leads to the proclamation that science communication efforts need to be effective. It explains how our communication efficiency can be affected by simple choices in the presentation layout, imagery, typeface selections and colour choices (Murchie and Diomede, 2020).

This will be considered as a vital understanding with the protype visual models and hypotheses that are being developed as a result of this research project. Utmost care will be taken with contemporary colour choices and fundamental visual frameworks for the layout designs. The aim of the creative project is to be able to communicate the idea in its complexity as effectively as possible to an audience with an interest in or practice based on the science of consciousness, especially researchers and research organisations interested in the field.

Finally, In the article *Improving Visual Communication of Science Through the Incorporation of Graphic Design Theories and Practices Into Science Communication* it is argued that there is a visual culture that is becoming prominent in our cultural identity in the contemporary 21st century. The article argues that as a consequence "images and diagrams have become an important tool with which to communicate science." (Murchie and Diomede, 2020). It also goes on to define two impediments to science communicators using visual elements effectively

(1) Visual material is typically treated as an add-on instead of being an integrated part of the whole. This impediment is recognized and reflected upon by the researcher's method of creation with the prototype visual models and hypotheses. This research project addresses this impediment existing as proof of where this "add-on" philosophy doesn't apply, with a fluid processual learning process and resulting visually expressive demonstration of a scientific idea

(2) There is a lack of identifying target audiences and refining visual elements for them specifically. It is argued that adopting aspects of design process from theory to practice can help visual communicators become more effective at addressing and informing those target audiences (Rodriguez Estrada and Davis, 2014). This article also highlighted the need for resulting visuals to be effective and efficient in communication so they may engage any audience that views them in a positive light. The target audience for this research is defined as anyone with a professional or academic interest in consciousness science and theology. Anyone with interest in knowing or understanding how the mind operates, how we think or perceive reality in relation to current models of consciousness, and any interest in science and theoretical physics. As with all visually communicated ideas, the essence of the developing visual hypothesis is the need to create a conversation and establish dialogue between researchers and their target audiences and being aware of this has helped the researcher develop visual components that are intended to simplistically and visually aid in the comprehension of the new ideas and visual problem solving being applied with critical thinking and emergent scientific and physics concepts.

Chapter 3 - Research Case Studies

This research project and the creative visual tasks that are being developed are forming within the scope of, and, with considerations for, the creative works of a number of key creative visual practitioners within the fields of art and science or as artists in STEM (Science, Technology, Engineering & Mathematics). These practitioners and their works will now be explored and evaluated in context and comparison to this research project and how their knowledge or theory and practice with visually communicating their research findings or 'Praxis' has helped or guided the researcher in developing their own.

Einstein

The first case study for consideration in line with the prototype visual models and hypotheses is Einstein's relativity. There are a number of important reasons for this. Relativity firstly defines the observer and to some degree, the role of the observer in explaining physics. This is key for the prototype visual model of the conscious experience of the observer. Also, aspects of special relativity i.e., descriptions of light cones are applied in showing the understanding and acceptance of the existence of future light, space and time, for the observer (Webb, 2018).

Because of his workings and the considerations through Newtonian laws of motion, Einstein was a determinist. The behaviours or nature of the electron may have proven he was wrong about God's penchant for playing dice with the universe (Kaku, 2021). But modern reflections and developments have led us to the understandings of adequate determinism (Smolin, 2018). Whereby, the quantum decoherence and probabilistic nature of the quantum realm bears little to no impact on events at the macro level of perception in relative terms (Smolin,2018). Hence, adequate determinism is

accepted as a core facet of the conscious experience of the observer and is applied to the prototype visual model and hypothesis. It is also applied to the causal reasoning arguments that arise from the model and the mechanics proposed. And as such, the visuals are re-opening the debate about determinism and concepts of free-will in relation to the human conscious experience.

Additionally, and quite crucially, within the theory of relativity there is a carefully considered and well-developed visual 3D geometrical model for the nature of gravity, and its mechanisms through interacting points of large mass in space time (Jonsson, 2004). This is proven to explain many things but most of all the motions and behaviours of the celestial bodies that map our cosmic night skies and beyond (Orzel, 2016). This model and the resulting equations are demonstrably effective in their visual application and for deriving and imparting understanding. The most recent proof of relativity being the detection of gravitational waves in space at LAGOS Observatory (Faller et al., 1989)

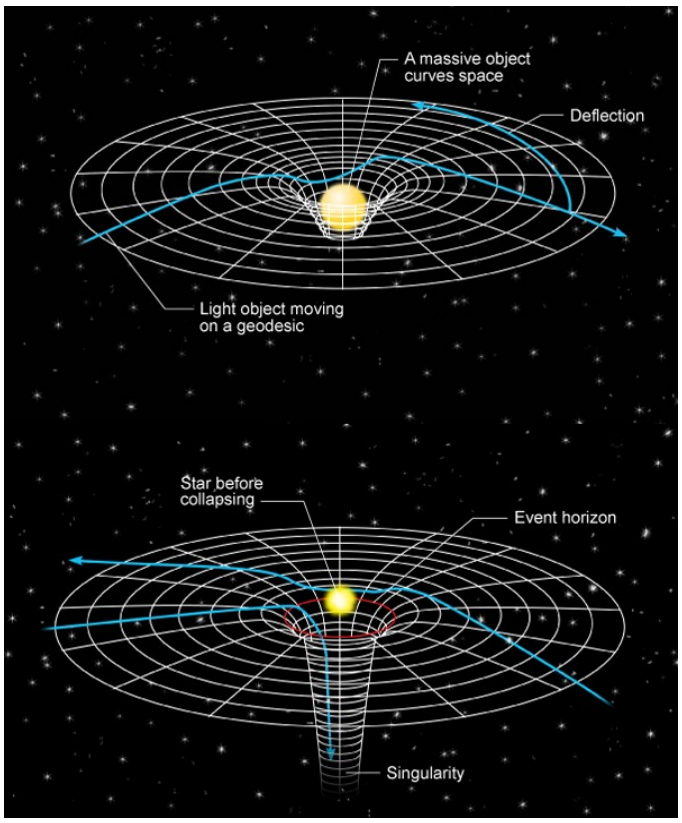


Fig. 3: This Illustration by Carin Cain

(Top) In Einstein's general theory of relativity, gravity is nothing more than the curvature of spacetime. A massive object, such as the sun, causes a deformation of the spacetime grid, while another object such as a planet or a light beam follows the shortest path (a "geodesic") on this grid. To an observer, this looks like a deflection of the trajectory caused by gravity.

(Bottom) A collapsing star can form a black hole so dense and massive that it creates a region of infinite curvature (a "singularity") so that—inside the event horizon—light cannot escape. Current research in gravitation is attempting to modify general relativity to account for such objects consistent with quantum theory (Nastase, 2009).

Further: It is clear here that a simple graphic design process has been necessary for communicating and imparting understanding. This simple visual design process is inherent to science and research and can be considered as a vital aspect of effective science communication. This kind of visual is simple, diagrammatic and conceptual, giving analogous context and meaning to basic visual representations of an abstract concept.

Einstein's relativity proposes a flat, curved and warping space-time understanding. He

famously visually applied a 2D grid to this flat space-time within a 3D reference frame.

This understanding and visual application of the understanding has been relied upon in

classrooms as a visual model for explaining the phenomena and nature of the relationship between curved and warping space-time and gravity since before his death (Redd, 2020).

This curved space-time further explains how orbiting bodies are actually in a state of free-fall around each other i.e., the international space-station is always falling towards the earth and missing, or, the earth is constantly falling towards the sun, and missing. This understanding gives us the ability to simulate gravity to some degree - if we wish. Whereby, creating a centrifugal force within the craft (like the ISS, for instance) would create a force that anchors you to the outer edges of the space available. Therefore, simulating a gravitational effect (Anderson, 2015).

All of this understanding is possible because of Einstein's relativity and the visual model he applied to be able to explain his ideas and conceptual thinking. Within the scope of this research project, relativity and the 3D geometric model for the nature of space-time and gravity is accepted and built upon in the prototype models for the nature of gravity and the conscious experience of the observer. It is important to highlight though that understandings for relativity and how we should communicate warped space time might have changed somewhat from the basic flat 2D grid in the 3D reference frame (Siegel, 2018).

Now we have models available with a 3D grid as illustrated in fig 3.

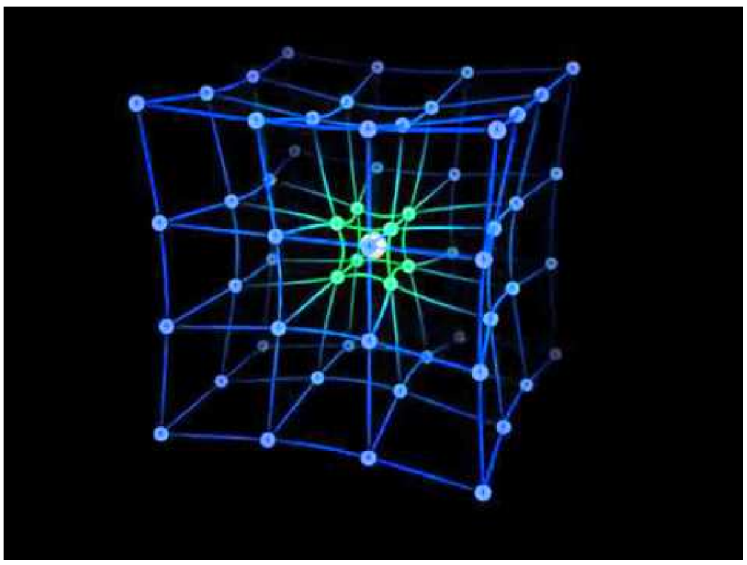


Fig. 4. Animation by LucasVB (Tumblr) ‘An animated look at how spacetime responds as mass moves through it. In a qualitative manner, this helps to showcase exactly how spacetime isn't merely a sheet of fabric, but that all of space itself gets curved by the presence and properties of the matter and energy within the Universe (Siegel, 2018).’

This visual understanding with the 3D cubed nature of space-time will be built upon and innovatively referenced in the workings for the prototype visual model for the nature of gravity and its relation to mass, matter, the Higgs boson and the universal Higgs field.

Relativity as a case study for this research is a vital resource and its clear from the visual examples and the history of brilliant minds proving relativity over and over through their work that it is a reliable concept and has mostly applicable theory. As a visual model, as part of the greater picture of understanding, relativity and Einstein’s visual mode of communication also justifies the core drive of this research project in the scope of the potentials of visual design and its efficacy in communicating new concepts and emergent principles of physics.

Einstein and his works inspired a shift in world consciousness and scientific understanding surrounding physics not just as a scientist but as a visual communicator. He may have been a keen practicing theoretical physicist, but he was also an artist with some of the most profound insights on the place of creativity and imagination in discovering

and developing human insight and finding meaning in existence (Rana, 2018). He can be famously quoted as saying “Knowledge will get you from A to B, but imagination will take you anywhere.” He is proof that mastering creativity is in itself an art, and like any art, creativity can empower you with new understandings or new knowledge. (Rana, 2017)

This understanding and open mind philosophy towards the arts and the place of creativity and imagination is further fundamental in the method and process of creation and applying knowledge with this research project to the prototype visual models and hypotheses.

Visual Models of Consciousness & Conscious Operations.

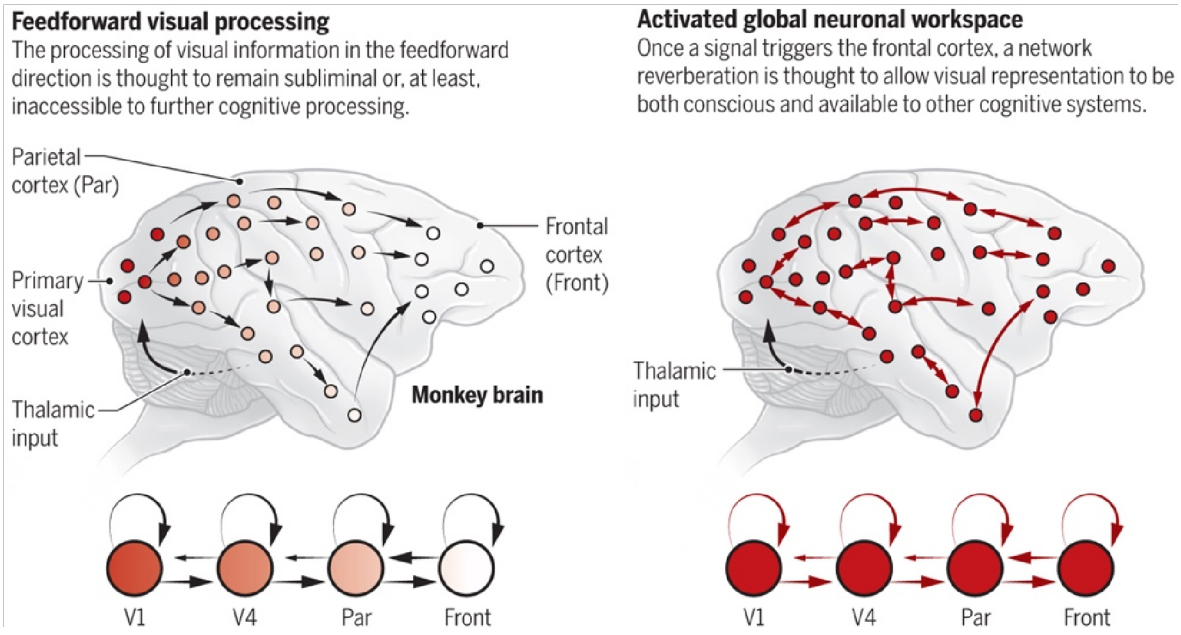


Fig. 5. A visual model of conscious operation within monkey brains. Infographic style with simple semiotic fluency in design and breakdown of information helps the complex understanding of this system to be efficiently understood by the audience (Mashour, 2018).

Credit: Lucy Reading-Ikkanda/Quanta Magazine.

This visual model for conscious operation was developed in line with the paper *The Controversial Correlates of Consciousness* (Mashour, 2018). This paper was again seminal and crucial to the research project. As can be seen, the visual presents a technical and scientific idea. It has elements of semiotic language and coding systems that express fluid explanations of complex interactions generated within the brains of monkeys in response to environmental stimulus (Mashour, 2018).

There are a number of visual models and diagrams offered online for consideration in line with this pathway for modelling the conscious experience of the observer and they are largely in this format and style. Some being far simpler in terms of visual presentation. This visual approach and method of communication for the model in Fig.3. is based on a well referenced research paper and its presentation is strongly rooted in infographics and simple semiotic language through visual design. This is a brilliant example in context of this research project and the developing prototype visual models and hypotheses.

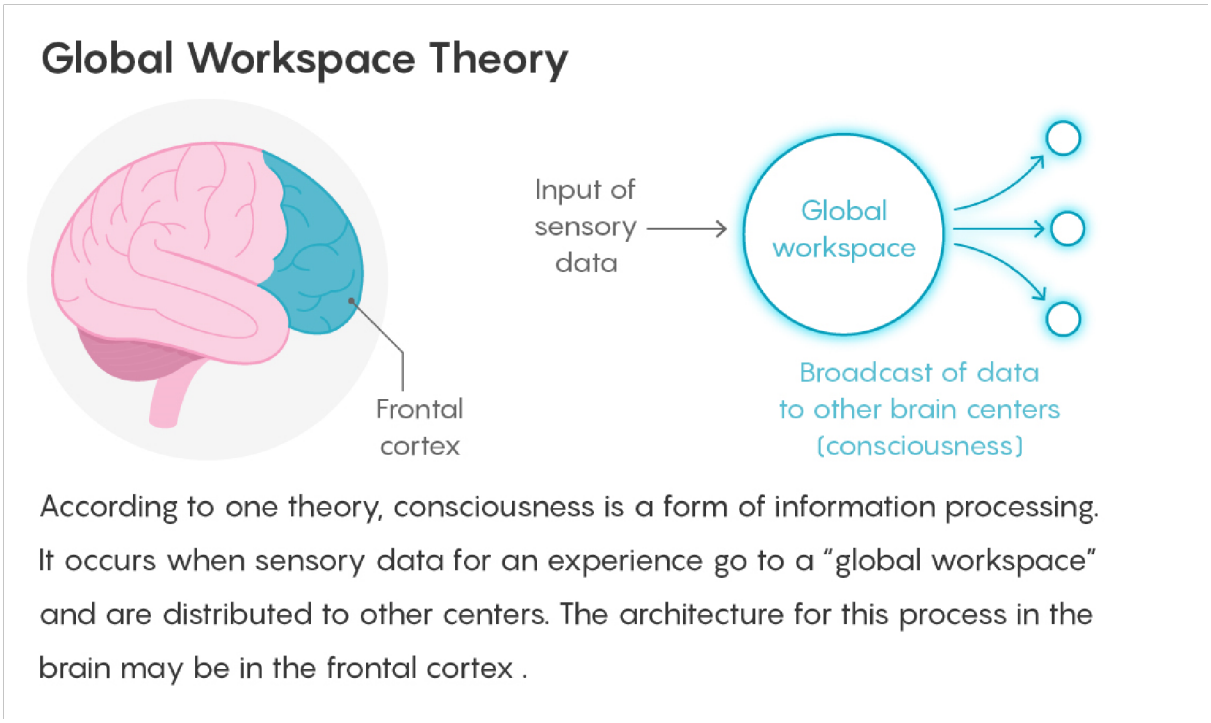


Fig.6. Global Workspace Theory is explainable through a basic visual model for the possible understanding of conscious operation in the brain. The understandings convey the hypothesis for information processing and the role of this sensory data processing. This is another simple semiotic style infographic by Lucy Reading-Ikkanda/Quanta Magazine.

Credit: Lucy Reading-Ikkanda/Quanta Magazine.

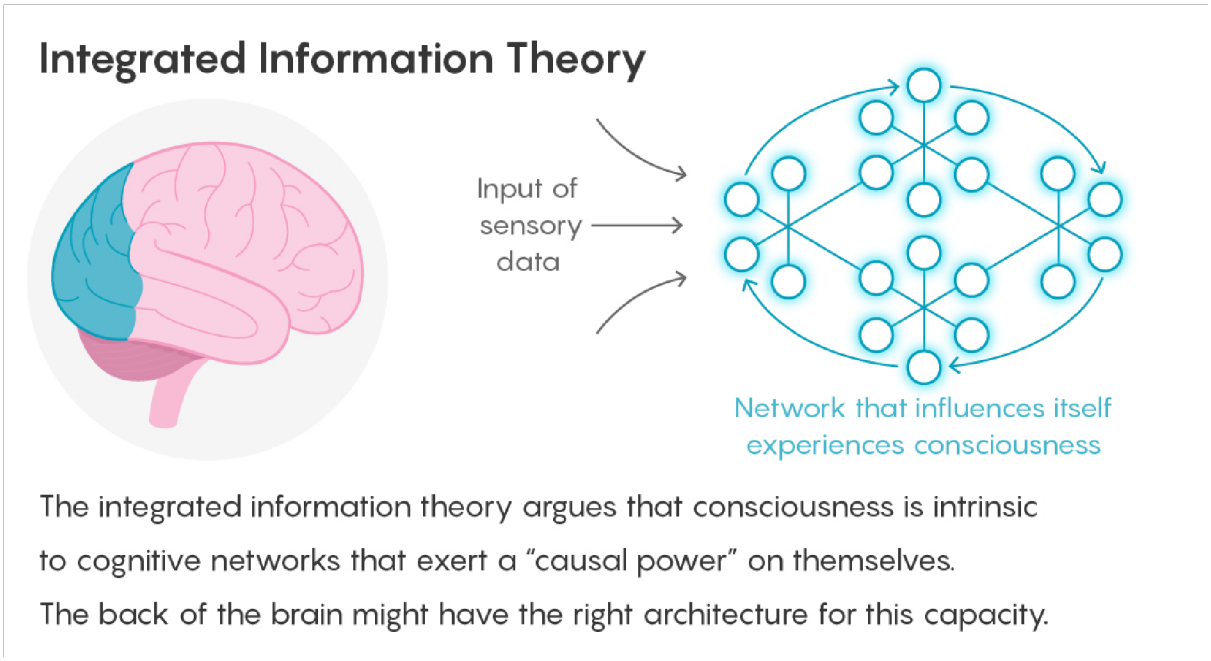


Fig. 7. Integrated Information Theory is another complex model of consciousness that can be explained through simple semiotic style. It shows how sensory data impacts a neural network that influences itself in an exertion of "Causal power" It is theorised that the rear of the brain might have the architecture for this capacity. This is another simple semiotic style infographic.

Credit: Lucy Reading-Ikkanda/Quanta Magazine.

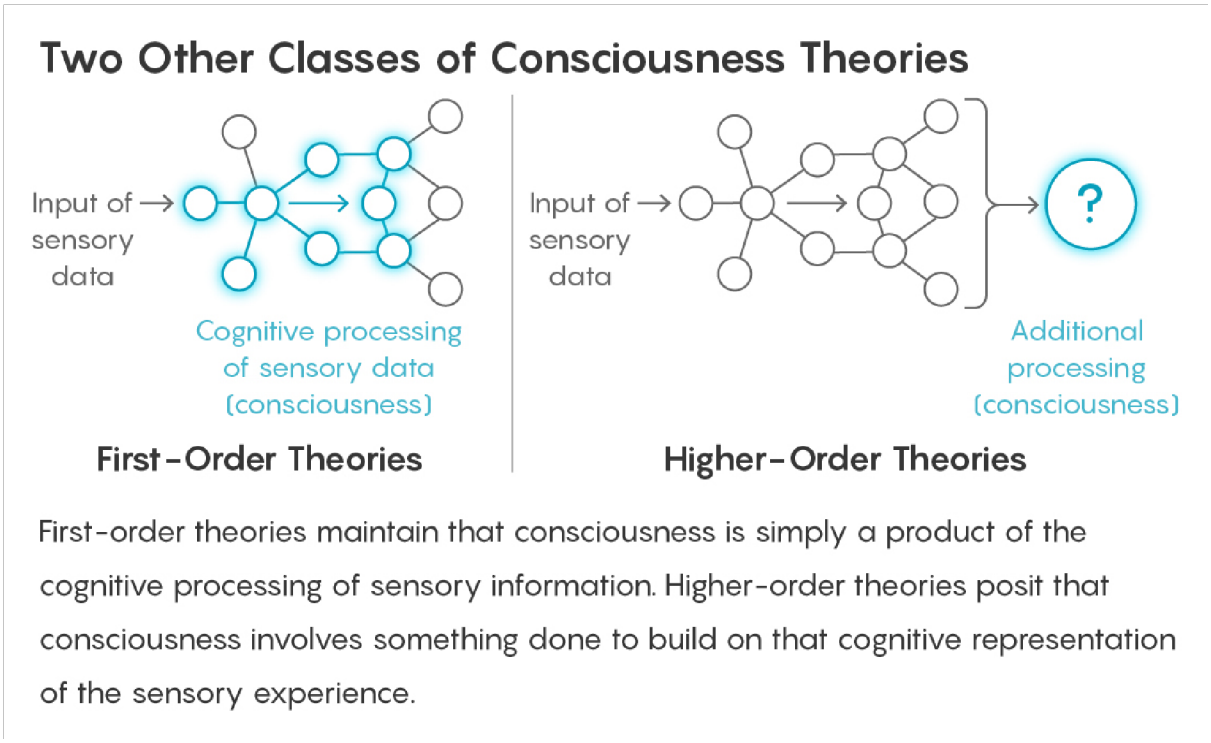


Fig. 8. Another example of the simple semiotic style. This visual example shows the complexities of two classes of consciousness theories. First-Order theories maintain that consciousness is simply a product of the cognitive processing of sensory information. Higher order theories posit that consciousness involves "something done" to build on that cognitive representation of the sensory conscious experience. This is another simple semiotic style infographic that lends credence to the Graphical Abstract and diagrammatic process through graphic design and scientific visual communication and problem solving.

Credit: Lucy Reading-Ikkanda/Quanta Magazine.

These simple info graphics were developed along with the article "Neuroscience Readies for a Showdown Over Consciousness Ideas" in Quanta Magazine. In this article it is broken down that there is a global research and science project aiming at proving or disproving certain aspects of competing theories in the realms of consciousness science. The article explains how theorists are pitching these ideas against each other. Not so much to find a definitive answer, but, to at the very least, start ruling out certain possibilities.

The article explains in depth the problems facing scientists and theorists with regard to the issue of solving consciousness. It also provides the reader with an insight into why

solving consciousness has been so difficult. It gives a run down on the current state of affairs as well as offering these visual options as models for understanding aspects of those complex theories as a lay man reader. The visual stimuli work with the large body text in the article in a congruent and cohesive fashion, helping to more easily visualise those aspects of the theory that are applied to aspects of neurology. You can see from fig 4, fig 5 and fig 6 that these ideas are easily simplified and communicable in part through simple visual modes and basic visual formats. This understanding is essential when considering this research project and the visual outcomes.

The philosophy, creatively speaking for developing the visual models, in light of models like these examples, is to keep the visual simple, informative and engaging. In terms of the direct practical reflections the prototype visual models and hypotheses will be created and communicated in an info-graphic nature and formal graphic form with use of appropriate grid structures. The grid structures intended to be used will also be visual theoretical frameworks, and, as such, the prototype visual models and hypotheses are intended to present as visual theoretical frameworks inside visual theoretical frameworks. This will contribute to the "Prototype" nature of the models and the research project so far as it keeps them in a state of development and openness to new direction and new learning with new information that may come to be presented or that which may present itself to the researcher in due course (Descartes, 1637) (Petrov, 2021).

> "Compared to other existing theories, HOT can more readily account for complex everyday experiences, such as emotions and episodic memories," Lau and his colleagues, the philosopher Richard Brown of LaGuardia Community College and the neuroscientist Joseph LeDoux of New York University, wrote recently. The Templeton World Charity Foundation has assigned further funds to test such ideas as it will GWT and IIT."

Furthermore, with regard to the learning from this article, it can be said that the visual theoretical framework presented as part of this research project for the possible nature of the conscious experience of the observer is a higher-order theory as it accounts for

complex everyday experiences, such as emotions and episodic memories. It will completely rely on a unification of quantum mechanics and relativity in the definition of Endoquantum Mechanics as the “something done” to build on those cognitive representations of the sensory experience, in all of our conscious perceptions and awareness of the physical, psychical, subjective and objective facets of experiencing this existence.

This is explored through the resulting creative and theoretical collaborative development of The Diamond Model of Relative Consciousness & Endoquantum Mechanics through graphic design and visual thinking processes, presented further through this dissertation.

Chapter 4 - Practice Based Research

I. The Theory of Relative Consciousness – A prototype visual model and hypothesis for the conscious experience of the observer.

The Theory of Relative Consciousness is a prototype visual model, theoretical framework and hypothesis for the conscious experience of the observer from life to death. Collectively the diagrams serve as a visual theoretical model and infographic, it uses large body text formatting, information hierarchy, complex grid structures, simple semiotics and age-old simple visual modelling techniques highlighted through this dissertation process for explaining ideas and relationships between the phenomena of consciousness and the prevailing schools of thought, understanding and practical applied sciences.

Firstly, the model explains in the text about the implications on our use of language and terminology when considering this new understanding. Next to this text, there is inclusion of a Venn diagram. This Venn diagram helps to draw focus to the key areas of interest for this proposed new set of mechanics for that human conscious experience, which also follows as a visually expressive component of the core ideas in the model.

In the core text the model explains that linguistically in terms of physics we have to accept that the term “Relative Consciousness” may be the only appropriate option. This is argued for a number of reasons. As the model states…

> To explain it to a six-year-old, if I am conscious and you in comparison are relatively conscious, and then some in comparison can be relatively unconscious, then I must be relatively conscious compared to you and them and so we all have a relative consciousness.

Further it is argued that our conscious awareness is intrinsically linked to our relative perceptions of time and our experiences of photons in the environment. (Redd, 2020) (Andal, 2020) it is suggested as a natural facet of our placement on earth we have an innate relative conscious awareness within the universe that is completely native to our solar system. If we were to leave our planet for long space travel at high speeds the laws of relativity depict that we could experience time at a slower rate than anyone on the earth. Essentially travelling to the future upon return as we would be younger than say our twin brothers or sisters who we left behind. If we were to travel into space to never return, and we didn't keep a record of the time and date that we left and a clock counting the time on earth, after a while you wouldn't be able to tell how old you are. There would be no relative point of reference to measure from and so, your conscious awareness and experience as an individual observer is dependent on your relative nature to the earth and other individual observers and all of their causal workings within the biosphere of earth and the greater solar system that contribute to sustaining our senses of time and crucially, the way we measure time it as observers in relation to each other. (Redd, 2020).

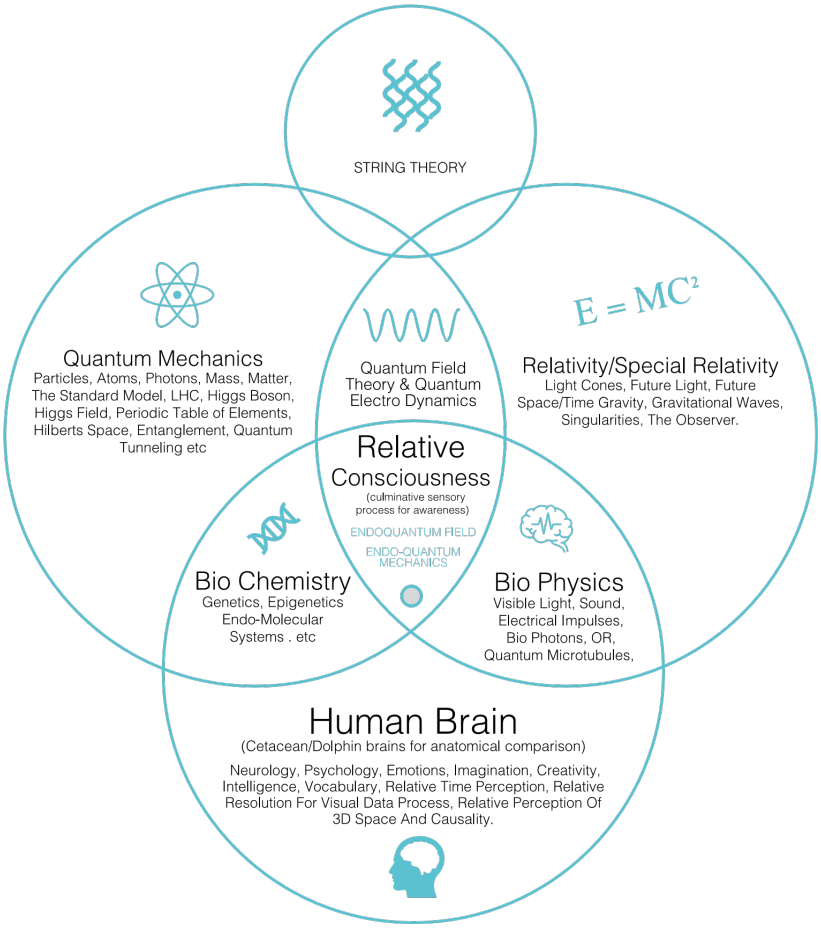


Fig 9: The Venn diagram for the Theory of Relative Consciousness & Endoquantum Mechanics and the simplification of the hypothesis for the potential role endo-quantum mechanics facilitating the conscious experience of the observer. Collectively it illustrates the connections between a number of key areas of scientific research and knowledge and unifies them in what can be digested as a simple understanding for the nature of conscious awareness of any given moment or any given scene.

Further: The Venn diagram is somewhat debated as the best way to visually communicate interlinking ideas and proposing understanding for logical kinetic relationships between areas of knowledge or understanding which offers a visually logical kinetic means of communicating big ideas. While there are limitations, and sometimes satirical references to this visual modelling technique it is clearly demonstrable that the Venn diagram process is efficient and effective for communicating the hypothesis and definition of Endoquantum Mechanics. The use of this colour blue is a direct link to popular visual resources throughout consciousness science visual communication. It is used throughout this Venn diagram and the resulting prototype models and graphic design processes to highlight and articulate the immaterial phenomena of Endoquantum Mechanics and anything within the mechanics that relates to the Endoquantum system being hypothesised. The grey is used to visually determine physical properties or areas of research in physics which can be argued, collectively sustain our conscious experience.

These three main areas of interest in the Venn diagram are Quantum Mechanics, Relativity and their relationship to the workings of physics, biology and chemistry in the systems of the human brain. This is a largely complex diagram but is the most efficient way to simplify the hypothesis. This Venn diagram shows the links between a vast array of already accepted science theory and scientific research projects worldwide surrounding a number of complex fields of enquiry. Including but not limited to the role bio-photons in the brain, (arXiv, E., 2010) endo-molecular chemical systems in general cell and larger anatomical biology, (Chown, 2020) and quantum microtubules (Hameroff & Penrose, 1996) (Science. Daily, 2014) etc., and fits them together in a framework where they interlink and correspond logically to all of the information currently available (Eldman et al, 2011). This innovatively unifies the role of quantum mechanics and relativity with brain function in the mechanics of the conscious experience of the observer (Petrov, 2021) (Ball, 2017) (Hameroff & Penrose, 2007).

Simply put, the Venn diagram helps suggest an answer to Penrose's call for "new physics" (Penrose, 2014) as it created the visual hypothesis where by the audience can deduce with the information that there is an area of new physics being highlighted for understanding the nature of the conscious experience of the observer in relation to these age-old schools of thought and the modern and contemporary understandings they have led to in academic and professional scientific research practice. This new area of physics that is being highlighted after research and reflection has been referred to and defined within the model as *Endo-Quantum Mechanics.*

This potentially new understanding could be revolutionary in a number of senses, but it is also key to the understanding of the proposed model and its varying visual components offered for explaining the conscious experience of the observer as a complete

endoquantum system operating on understandings close the Penrose interpretation of consciousness.

Fig 10: The hypothesized mechanics for the conscious experience of the observer. Quantifying the experience as a complete system from life to death. This graphic shows through simple linear graphical diagrammatic style, a system that is then maintained by all of the aspects illustrated in the Venn diagram. This is also where you can see that the researcher was able to formulate this hypothesis by observing an anomaly in their own conscious experience and memory function which would suggest this retro causal reasoning applying over the formal causal reasoning.

Further: The use of colour here is in line with the earlier explanations. While the grey indicates the physical parameters of 3d spacetime which we all experience throughout our lives. The blue then indicates the Endoquantum system at play which is the abstract phenomena. This is argued as building on cartesian dualism and the Penrose interpretation. This brings this abstract concept into a tangible visual diagrammatic system which illustrates a hypothesis for the nature of this Endoquantum system

throughout our memory timeline and conscious experience as observers. The diagram also illustrates local and non-local properties of our consciousness in showing that endoquantum systems like this one described here can maybe operate or have effects outside of the brain and even across distance.

The visual hypothesis consists of a number of key visual components. None more important than the mechanics section. In this area of the model the concept is communicated through simple linear diagrammatic and semiotic style. It quantifies the "conscious experience" (Penrose, 2014, 2019) of the observer from start to end. Or, from life to death. The duality or dualism within the system is clear (Descartes, 1637). We mentally and physically harmonise a brain-eye response to cosmic stimuli e.g. electromagnetic radiation, visible light etc (Visible Light and the eye's response, 2020). The blue areas of the mechanics section refer to the endo-quantum data within the brain e.g. awareness, memory, mental and emotional information of events or what the likes of Penrose would term as 'Qualia' (Penrose, 2019) (OMCAN, 2019). The standard grey lines show where we are then physically limited within the confines of the classical 3-dimensional universe famously depicted by the likes of Newton and Einstein and also how we are then bound with the temporal dimension of time to witness causality in only one direction.

The data points (Hameroff & Penrose, 2007) are lettered A, B, C, D to show how standard or formal logical causal reasoning would have us depict the order of events. What is exciting about the model is that, within the endo-quantum functions of that proposed system it was discovered that there should be the ability to create endo-quantum super-positions in states of awareness within the relative consciousness and the endo-quantum timeline of memory in the mind (Barret et al, 2020). Or, essentially making points A and B share the same endo-quantum state through the system of memory. The visual clearly highlights how this would be a function of a retro-causal feedback loop within the given system (Barret et al, 2020). The existence of this retro-causal loop and its

nature leads to an emergent causal reasoning. A reasoning for our existence and realities where we see our futures shaking hands with our past in a fluid cosmic interchange of cause and effect (Chown, 2020). This is a new philosophy and line of theory and understanding whereby our futures as observers can influence our past and maybe where those events of the past may inherently rely on the facts of a determined future (Chiribella, 2012).

This emergent causal reasoning within quantum systems has been explored through a number of now well referenced studies but never applied to any understandings involving everyday events (Barret et al, 2020). With the acceptance for the nature of the role that *Endoquantum Mechanics* may play in the mechanics for the conscious experience of the observer, the model posits that the understandings from these studies can then implicitly apply to everyday events for everyday observers. Having applied the retro-causal functions to the diagrammatic models it brings up timeless and contentious arguments and debates about the concepts of free-will and whether the facts and rules of physics as we understand them completely negate the need for such a facet of the conscious experience as free-will. This prototype model stands to add fuel to that conversational face-off between theorists and philosophers and also to pose new questions about the nature of our minds in relation to the universe we observe and which we are coming to understand more and more on a global cultural scale through our humanities, our sciences and our collective conscious cosmology.

Further, the term ‘Endo-Quantum Mechanics’ as a description for quantum mechanical systems within a human (biological|) system might be new but the field of study it refers to is not (Bailey, 2020). Molecular biologists and bio chemists are also particle physicists with a lot of the understandings being explained through some form of quantum mechanical processes and physics principles with one paper going as far as to

define “Particle Physics-ology” (Bailey, 2020) and “Quantum Biology”(Volk, 2018). For instance, one of the best known “sixth senses” in the animal kingdom is the ability to sense or naturally detect magnetic fields (Irving, 2021). The existence of Endo-Quantum Mechanics in its simplest form could be easily verified by measuring reactions in living cells to the presence of magnetic fields (Ikeya and Woodward, 2021). If there are any reactions at that level of observation to magnetic fields then we can establish that life and living beings might evolve naturally in the presence of magnetic fields and electromagnetic environmental stimuli and come to have systems that are in some part reliant on such “Endo-Quantum Mechanical” mechanisms. In the case of sensing magnetic fields, we must then further include for consideration those systems of conscious awareness.

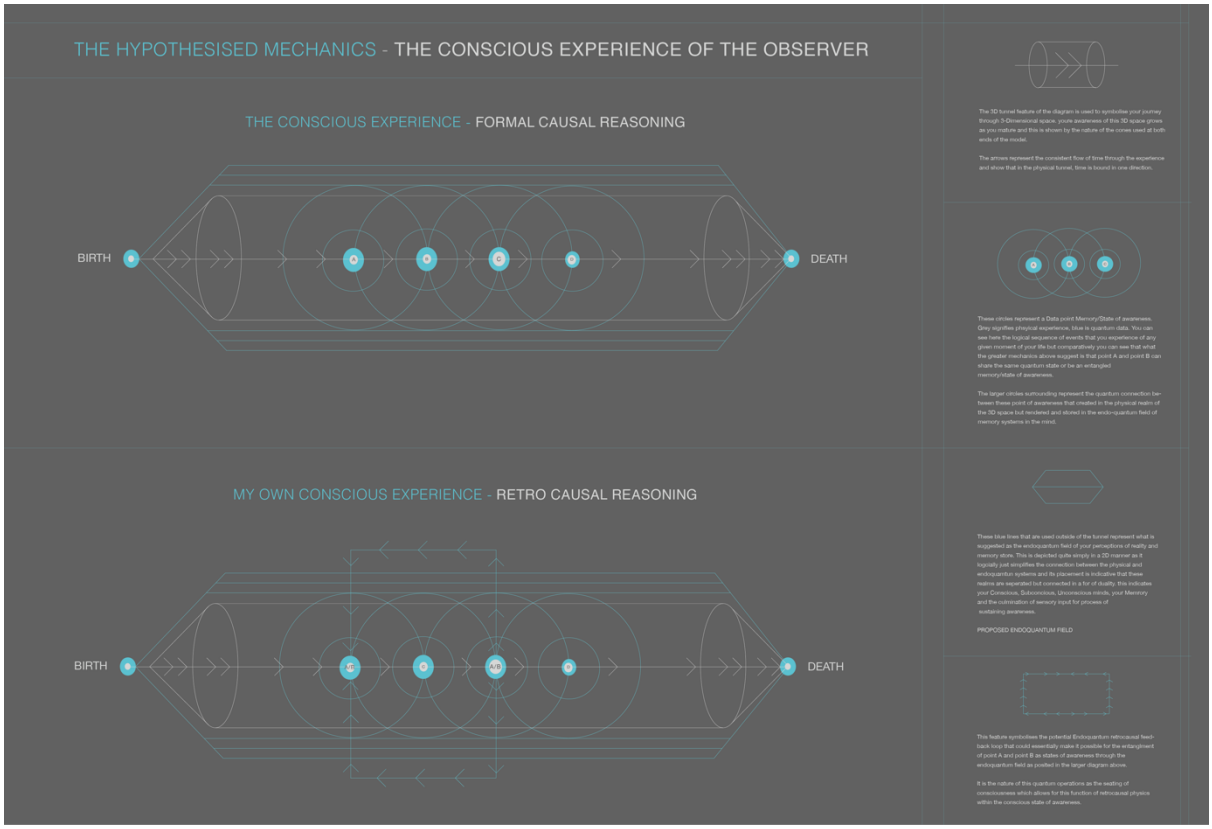


Fig 11: This is the final prototype visual model for the mechanics section of the hypothesis. there is a simple diagrammatic style and use of visual representations to make this abstract idea tangible through visual design.

Further: The blue represents the endoquantum system that operates throughout our conscious

experience, the grey then represents physical dimensions of space time for the observer to travel through. The use of blue and grey around the data points shows that memories are based on the Endoquantum system from a resultant awareness of a given scene. This simple use of colour is powerful for this mode of hypothesis because it's a basic way of highlighting the cartesian duality of the system and also the way in which quantum microtubules are helping us facilitate our conscious experience and any moment or any given scene of this reality. It shows where quantum microtubule function may facilitate entanglements with oneself at different points in the timeline whereby the observer is aware of themselves at different points of the timeline. We already understand this is a fact with the nature of looking back through our memories and it is suggested by this visual hypothesis and these simple logical diagrammatic principles that it is possible to look forward through our system of memories too.

As well as the mechanics section there is an area of information and a visual component of the model that explains the proposed new understanding for the nature of the relationship between cause and effect. This simple semiotic model shows how we would formally reason the process of cause and effect from a classical perspective. It then goes on to modify this simple semiotic in a way where it shows the new understanding for this relationship between cause and effect in relation to the conscious experience of the observer and this understanding derived from the mechanics section and Venn diagram development for supporting the attempt to appropriately define Endoquantum mechanics.

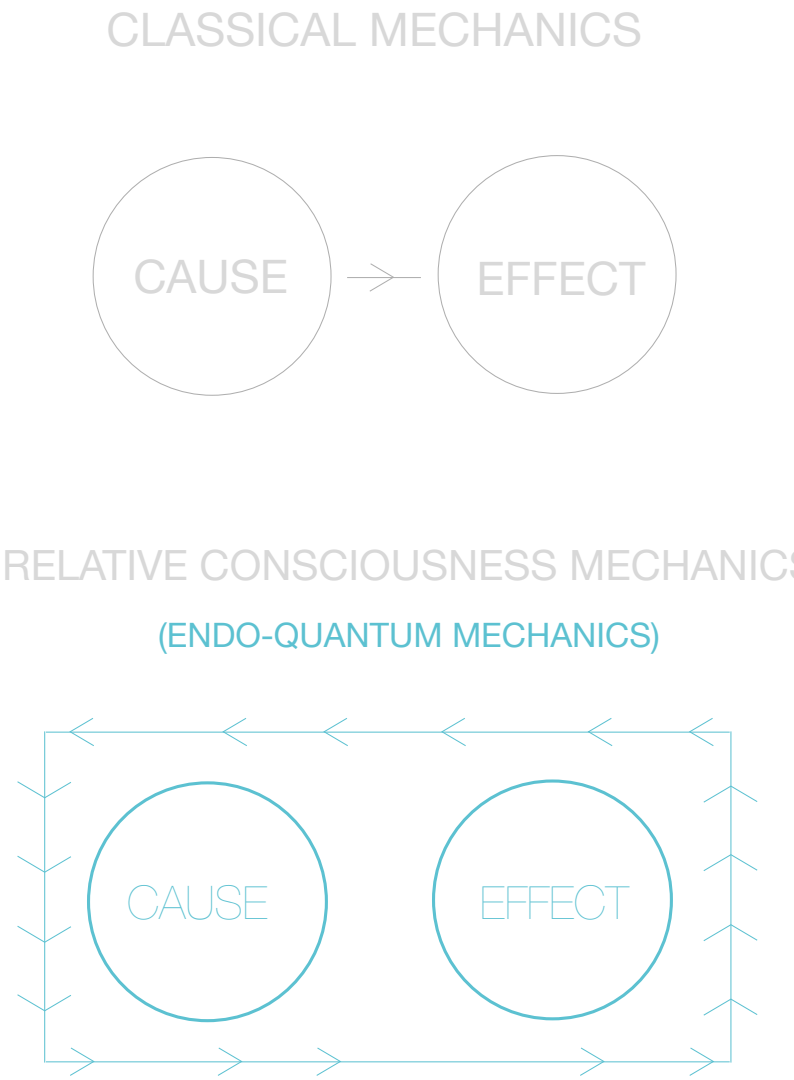


Fig 12: The proposed new mechanics for cause and effect derived from observing a Retrocausal anomaly in the researcher's timeline of memory. This Retrocausal handshake between the future and the past is suggested to be inherently required for quantum systems to operate rather than being considered as a by-product of any given quantum system. This image illustrates a non-linear relationship between cause and effect for observers in their minds, memories, and everyday lives through the operation of the endoquantum system for understanding and experiencing any given scene. It is clear that with Endoquantum mechanics, as a theory built on the Penrose interpretation, cause and effect is quite possibly not a one-way street and this is inherent in the understandings for hypothesis overall.

Further: This diagram and explanation took many sketches and many iterations before arriving in this state of simple diagrammatic language for such an abstract concept as superpositions in cause and effect throughout a conscious experience. In the end it was far simpler as a diagram to explain than the concept has ever been to understand and try to communicate without the visual aid and without the graphical abstract as a tool. Through these simple graphic design means, the use of colour for showing difference between classical physics theory and emergent physics theory is bold and systematic. It is clear to the audience that there is a new suggestion being made, the concept is articulated in simple semiotics and represents a large aspect of the theory work at play throughout the

visual hypothesis. It is argued by the researcher that the existence of this piece of visual problem solving would not be possible without having identified an appropriate anomaly for the study which lead to this understanding of that anomaly and thus the understanding of its operations through our conscious experience.

This component highlights the nature of these causal loops in adjusting our understanding of cause and effect in a way where the concept can be applied to everyday events and the greater cosmos. Cause and effect are then visually applied through signifying points A and B on the mechanics section previously illustrated, which are hypothesised to be in a superposition and this concept is applied to the idea of two black holes locked in orbit. Both equal in cause and both equal in effect. Who can say where this system began? This leads to the ultimate question of whether we can then apply this causal reasoning back onto the model. It is argued that this new understanding for the relationship between cause and effect would only be possible due to the nature of this Endo-Quantum aspect of the system.

The evaluation section of the model explores aspects of the mechanics in relation to what we understand about the nature of memory and its relationship to trauma. This is key as we can draw from the nature of dissociative disorders and the reformation of bombshell memories to say that instances of recalled trauma or historic abuse are mostly reliable as retrievable memories and states of awareness that we can visit mentally and physically in the form of flashbacks (Salmona, 2018). Crucially, in relation to this visual model it is psycho-traumatic instances that are the data points in the timeline. They are points of connected memory. Point A is an instance of being aware of a future traumatic event in the mind and further down the timeline is point B where the psycho-traumatic event occurs. So, this model is building on the understanding of memory functions with flashbacks and bombshell memories to simply say that it is possible within the endo-

quantum system offered for a what can only be described as a flash-forwards (Salmona, 2018).

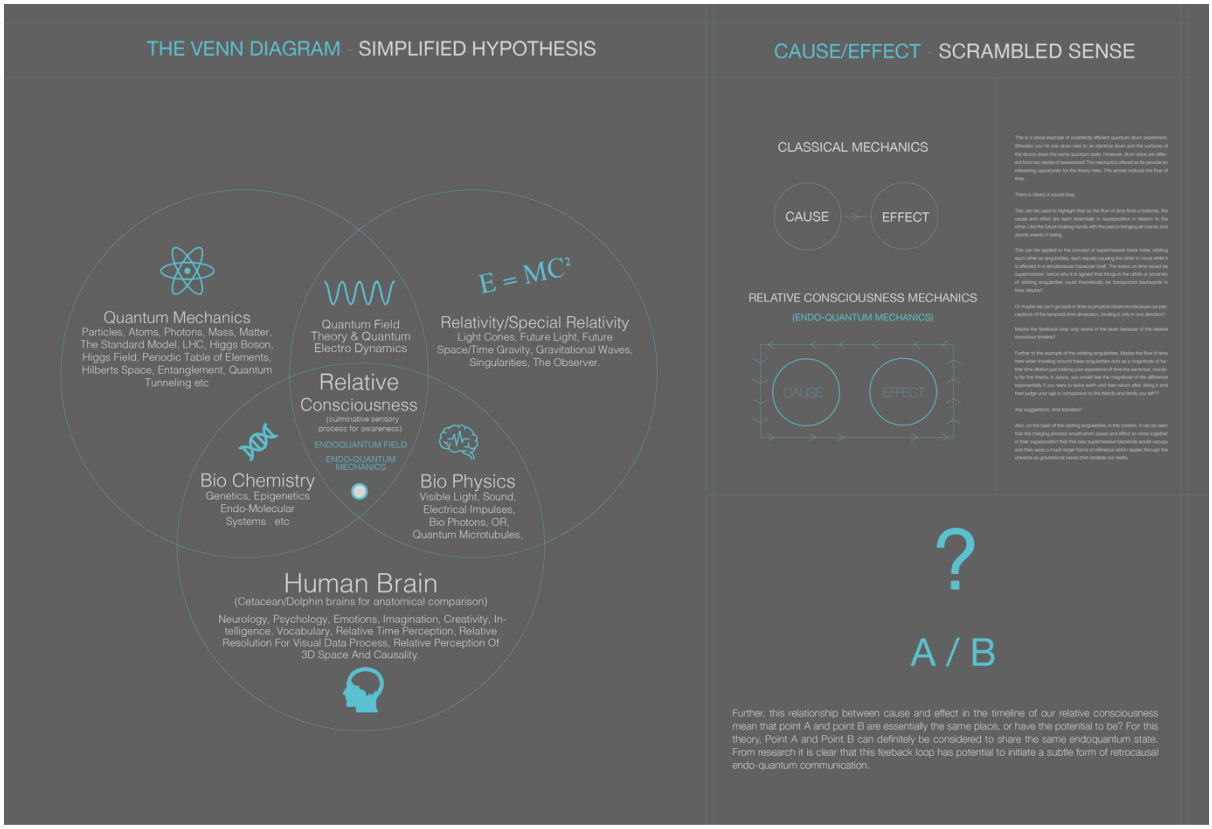


Fig 13: This is the second part of the final visual outcomes and is a large part of the outcome through visual model and prototype hypothesis whereby the Venn diagram is included for consideration along with the proposed new relationship between cause and effect and the breakdown of the theoretical basis for superposition behaviours between future and past memories in the timeline illustrated through the mechanics section.

Further: The Venn diagram is a key aspect as this shows all of the areas of interlocking scientific research that could apply in creating Endoquantum systems that operate through and within life forms and biological systems. There is a simple use of logical grid structure used throughout for creating hierarchy and allowing concentration on varying aspects separately and then they are collected in considering all understandings as a single coherent idea.

There is a thought experiment for consideration here, in line with this emergent causal reasoning.

> If the researcher is to test this in the future by finding a way to send visual information back to him/herself in their conscious state of awareness, and it is done successfully based on these mechanics then surely it would make sense that

> in the future they would send this information in this visual format and these mechanics and that maybe the test is already happening?

Considering that the visual model implies that subtle forms of quantum communication may be possible within the conscious experience. A test of this then *endo-quantum communication* would surely be to try and prove it sooner than the future point of testing?

This prototype visual model for the conscious experience of the observer and the developing theoretical framework as a visual hypothesis, collectively brings aspects of psychology into the realm of scientific research and enquiry in physics. As a developing visual theoretical framework based purely on academic research it remains infinitely open and expandable and further testable as a plausible model for the conscious experience of the observer, within the realms of art & design research and practice within the fields of visual scientific modelling and *Mathematical Consciousness Science*. (OMCAN, 2019) (Oxford University, 2019)

II. Defining Endoquantum Mechanics

> **Endo-**
>
> A combining form meaning “within,” used in the formation of compound words: endocardial.

All of the following explanations and understandings have been used to create an infographic and visual model for defining endoquantum mechanics which will be included for consideration at the end of this section.

1. Endoquantum Mechanics within Neurology, Biology and General Physiology.

This proposed new definition for this already existing but not well-defined branch of physics, at this stage of the research journey is a simple but crucial development for the prototype model's further expansion and refinement and will also be vital if any real-world applications of this theory are to arise further on.

The term "Endo" in context of general physiology simply refers to the quantum functions and systems within that biological system. And in the case of the prototype visual model for the conscious experience of the observer and for consideration in line with general physiology it is proposed that this simple definition is not only relevant but may be becoming increasingly necessary not just for deeper understanding throughout our anatomies and separate organ functions but as suggested by the simple graphic for defining these potential roles of endoquantum mechanics, more than likely our brain function and arguably our underlying consciousness .

1.1 The Lungs

The lungs' main role is to bring in air from the atmosphere and pass oxygen into the bloodstream. The lungs do this via myoglobin proteins which contain iron atoms. These iron atoms link with oxygen molecules when the iron atom transfers negative electric charges to an oxygen molecule which enables the molecule to attach itself to the entire myoglobin protein. Using an Extension of Density Functional Theory (DFT, NOBEL PRIZE 1998) called Dynamical Mean-Field Theory (DMFT) researcher's analysis revealed that an effect called entanglement plays a critical role in binding oxygen molecules to the myoglobin protein. Entanglement is a quintessential characteristic of quantum mechanics that links pairs of electrons so strongly that they no longer act

independently. The process also involves Hund's exchange, another quantum-mechanical property that previous simulations had ignored. These effects are said to strengthen the direct bonding between iron and oxygen, and also enhance electrostatic interactions with the protein (Gwynne, 2014).

1.2 The Liver.

The liver regulates most chemical levels in the blood and excretes a product called bile. This helps carry away waste products from the liver. All the blood leaving the stomach and intestines passes through the liver. (Kalra, Yetiskul, Wehrle and Tuma, 2021) In recent years, quantum dots (QDs) have potential applications in technology, research and medicine. The small particle size is coupled to their unique chemical and physical properties and their excellent fluorescence characteristics. A growing number of studies have shown that QDs are distributed to secondary organs through multiple pathways, while the liver is the main reservoir of QDs. (Lu, Tang and Zhang, 2018)

1.3 The Pancreas.

The pancreas is an organ located in the abdomen. It plays an essential role in converting the food we eat into fuel for the body's cells. The pancreas has two main functions: an exocrine function that helps in digestion and an endocrine function that regulates blood sugar. (The pancreas is an exocrine and endocrine gland | Lifespan.io, 2021) The human being has two different amylases, one in the saliva (HAS) and the other in the pancreas (HPA). In their work researchers studied the catalytic mechanism of the human pancreatic α-amylase. Their final goal was to determine the catalytic mechanism of the HPA with

atomic detail, using computational methods. They demonstrated that the HPA catalytic mechanism consisted of two steps, in which the first mechanistic step (glycosylation step) involved the breaking of the glycosidic bond that culminated in the formation of a covalent intermediate. The second step (deglycolysation step) completed the hydrolysis of the sugar (Pinto et al., 2015).

1.4 The Small & Large Intestine

Your small intestine moves water from your bloodstream into your GI tract to help break down food. Your small intestine also absorbs water with other nutrients. In your large intestine, more water moves from your GI tract into your bloodstream.(Digestive System Information and Facts, 2021) Millions of neurons in the gastrointestinal tract coordinate their activity to generate the muscle contractions that propel waste through the last leg of the digestive system, according to a study of isolated mouse colons published in JNeurosci. The newly identified neuronal firing pattern may represent an early feature preserved through the evolution of nervous systems (Spencer et al, 2018).

1.5 The Stomach

The stomach is a bean-shaped sack located behind the lower ribs. ... As it secretes acid and enzymes, the stomach muscles contract in a process called peristalsis to mix the food with the acid and enzymes. The acid also works to kill harmful microbes that may have made their way into the body along with food and drink. Once food is swallowed, it passes through the oesophagus into the stomach. A large, muscular chamber, the stomach produces digestive juices like pepsin, lipase, and hydrochloric acid, which digest and dissolve stomach contents (Britannica, n.d.,).

1.6 The Kidneys.

The kidneys filter extra water and toxins from the blood. The kidneys filter about 120 to 152 quarts (113 to 144 litres) of blood to create 1 to 2 quarts (0.94 to 1.8 l) of urine every day, according to the National Institutes of Health (NIH). They aren't just one big filtering sponge, though. Each kidney is a system of millions of tiny filters called nephrons. A nephron has two parts. The glomerulus is the first part of the filter. It strains blood cells and large molecules from the toxins and fluid. The fluids and toxins that pass through then go through the tubule. The tubule collects minerals that the body needs and puts them back into the bloodstream and filters out more toxins. While filtering, the kidneys produce urine to carry the toxins away. The urine is sent through two tubes called ureters down to the bladder, where the urine then leaves the body through the urethra (Bradford, 2016).

1.7 The Heart.

On average, the human heart beats three billion beats per lifetime (Davis, n.d.). The impulse starts in a small bundle of specialized cells located in the right atrium, called the SA node. The electrical activity spreads through the walls of the atria and causes them to contract. This forces blood into the ventricles. The SA node sets the rate and rhythm of your heartbeat (How your heart works, 2021). In tackling atrial fibrillation in patients, researchers at University College London are proposing new quantum technologies (New quantum technology could help diagnose and treat heart condition, 2021). Electromagnetic induction imaging has been successfully used in a range of practical uses

such as non-destructive evaluation, material characterization, and security screening, but this is the first time that it's been shown to be useful for biomedical imaging. They think it will be safe to use as it would expose organs, such as the heart, to one-billionth the magnetic field commonly used in MRI scanners (Deans, Marmugi and Renzoni, 2020). " It was only possible by using quantum technologies and we are excited about the potential applications for improving clinical outcomes of atrial fibrillation." (New quantum technology could help diagnose and treat heart condition, 2021). The team envision an array of their quantum sensors that can be placed over the heart, giving readings in a matter of seconds (New quantum technology could help diagnose and treat heart condition, 2021).

1.8 The Brain.

It is already known that quantum mechanics plays a role in the brain, since quantum mechanics determines the shapes and properties of molecules like neurotransmitters and proteins, and these molecules affect how the brain works. This is the reason that drugs such as morphine affect consciousness (Adams and Petruccione, 2020). The existence of quantum microtubules within neurons (Penrose, 1996, 2007, 2014) and biophotons (arXiv, E., 2010.) within the brain is widely accepted and their role in the workings of the brain neurology and in facilitating the human conscious experience is a topic for timeless debate. It is argued by many that some form of quantum mechanics could potentially lead to understanding that conscious experience.

2. **The role of visual thinking and visual problem solving and application of design principles for this aspect of the process and visual outcomes.**

This research focus and outcome from the Mres course has served to highlight the importance of visual thinking and visual problem solving in physics. It has also highlighted that the world of science communication relies in part on visual solutions for communicating key concepts through education settings and curriculum to professional science enterprise. Further, the continuation of this study for the researcher through Mathematical Consciousness Sciences only serves to unveil a world of even more possibilities for other visual thinking, creative problem solvers as artists and designers in STEM.

This visual development of infographic elements used throughout the hypothesis helped to highlight this potential new definition for this branch of physics in a way where it is clear this would not have been possible without a visual thinking and processual approach through a simple graphic design process.

Visual thinking and the creative process of trying to explain this idea has led me to discover a the potential for a higher order theory of consciousness by attention to memory which is based on the blueprints for what is hypothesized as a unified field theory in the physics of the conscious experience of the observer sustained by what may be endo-quantum operations within our neurology and anatomies. Unifying consciousness through the hypothesis with quantum mechanics, relativity, brain neurology and cosmic elemental anatomy as explained at its base level through the application of the standard model of particle physics.

It is potentially a visual unified field theory of everything or at the very least a possible blueprint for one and this is communicated through the graphic design system and infographic approach to imparting knowledge. The use of basic grid structures as a tool of graphic design for the the visual models and collective theoretical hypothesis mean that these are then visual theoretical frameworks defined and explained through a visual theoretical framework. The use of the Helvetica typeface is to bring the reader's attention and to capture their minds, hopefully to draw them in to the learning process and the discovery of the important questions along the way.

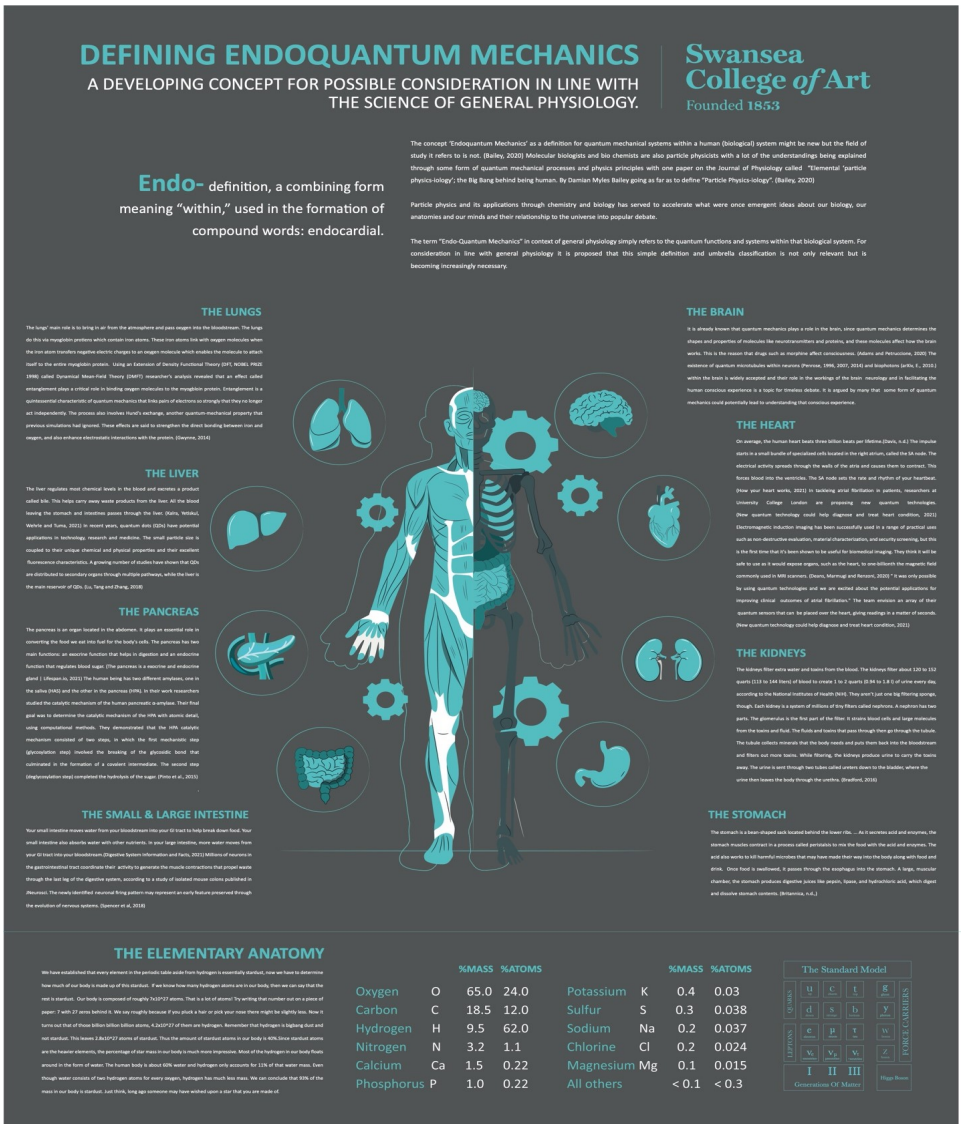


Fig. 14: this is the fourth part of the final visual outcomes of this processual learning endeavour. Defining Endo-Quantum Mechanics – A working visual model relating the

quantum properties of anatomy to the theory of relative consciousness through illustrating all of the quantum operations found within the human body. Also, it contains links to the percentages of elements in our chemical composition and relates this understanding of the elementary anatomy to the standard model of particle physics.

Further: The same colour palette is used throughout this model for the same graphical and visually communicative values as all of the other diagrams that have been produced in this visual thinking process. However, throughout this diagram the blue is used to represent all areas of the Endoquantum Mechanics at play through the human physiology and anatomy of the human being or, the observer. It is suggested that if quantum functions can be found this often in such crucial workings of the human biology, the surely it is then easy to delineate a basic understanding that Quantum Mechanics also [lays a role in the facilitation of our conscious experience and the life system of our body which sustains that experience throughout our life.

To settle the proposed new definition and understand how this has been applied in the visual hypothesis of Endoquantum Mechanics, we can gain clearer understanding by reading the Princeton Engineering Anomalies Research(P.E.A.R) white paper *Endophysical Models Based On Empirical Data* by the late Dr Robert Jahn of Princeton University and the late honorary Dr Brenda Dunne.

In the first instance it is clear from the title that the term “Endo” as combining form is appropriate language and accurate for a proposed theory of consciousness and within these frames of dialogue, in the separate sciences and, the term “Endoquantum Mechanics” as it is and has been used is then applied appropriately throughout this research project; From the visual hypothesis, to this written thesis. (Jahn & Dunne, 2005).

It is also then clear that this term, “Endoquantum Mechanics.”, is an accurate definition and based on sound deductions made after reading the wealth of Penrose and Hameroff literature. With this reading, considering the nature of the perceived anomaly in researchers own autistic memory function in line with reasoning through critical thought and applied visual problem solving in the concepts of unifying relativity and quantum mechanics, both being inherently fundamental to this reality. It is clear that there is an opportunity for a unified field theory of consciousness when then defining “Endoquantum

Mechanics" as the seat of consciousness. It is also clear that this understanding is then being appropriately applied and accurately defined in the suggesting a possible new paradigm in physics for considering the conscious experience of the observer and the nature of the human conscious experience in this universe. That of which is expressed throughout the final visual models and prototype hypothesis presented through this dissertation (Jahn & Dunne, 2005).

This paper*, Endophysical Models Based on Empirical Data* is also a starting point and a key reference for going further with this research and looking into the historic P.E.A.R. data sets and experimental methods of testing and measuring conscious experiences with quantum random event generator technology (R.E.G.'s) This is a technology which has so far come to prove in many reproducible experiments and masses of statistically significant events that there is some form of quantum field of consciousness within us and between us as humans and as consciously aware biological and chemistry driven universal beings.

This quantum field of consciousness is clearly both local in your brain and anatomy and non-local in having relative effects on each other and the environment. It is well established through their experiments that combined intentions have significant effects on R.E.G.'s and it is further imparted that combined intentions between romantically bonded male/female couples showed the most prominent conscious imprints on the R.E.G devices being used. This quantum field of consciousness, in line with the appropriate definition of "Endoquantum Mechanics" is referred to in the visual hypothesis as the Endoquantum Field of Consciousness and the Endoquantum Field of Memory (Jahn & Dunne, 2005).

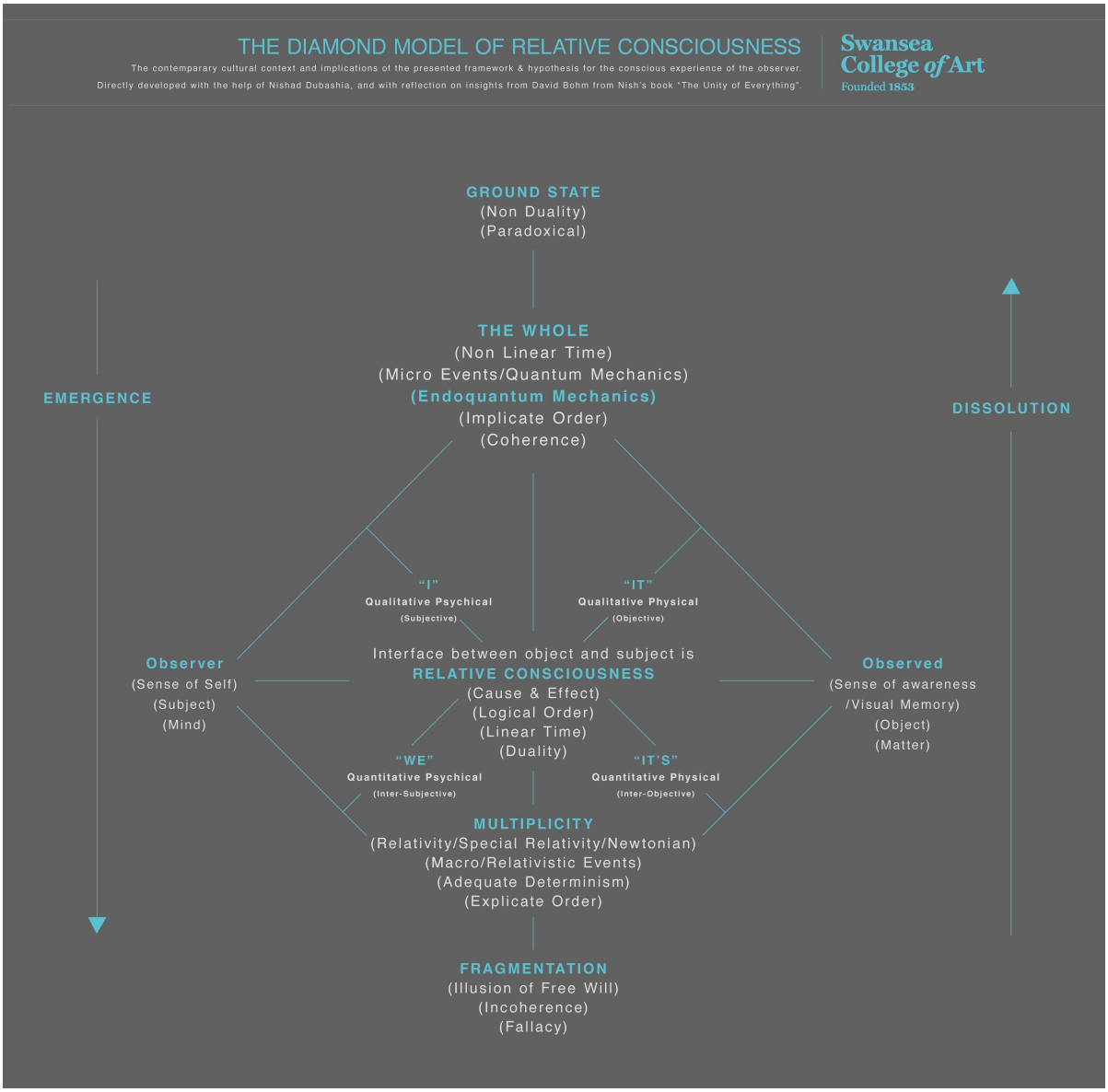
III. The Diamond Model of Relative Consciousness

As part of this second year of the research degree program the researcher was formally invited to attend a The Science & Consciousness Conference in York in November 2021. Part of the scheduled talks was a presentation by Nishad Dubashia (Ubiquity, 2021). In his speech to the conference he spoke about his diamond model. This is something he confessed to me that was developed a lot earlier in his life and something he only noticed the true value of later on, after a number of personal experiences. Namely his conversation with David Bohm. Nish has written about the diamond model and how it can be directly applied to a number of ancient civilisations and the ancient traditions of religions and their teachings. Namely, he related it to Hinduism, Buddhism, Taoism, Judaism, Christianity, Neoplatonism, and the philosophy of Krishnamurti. Also, included in his book, *"Unity of Everything"* is David Bohm's advocation for the use of the model as way of articulating these cultural complexities in an elegant and coherent fashion. And, the application of the diamond model to his own work and research into consciousness (Dubashia, 2018).

While at the conference the researcher was able to speak closer with Nishad and explain The Theory of Relative Consciousness and the concept of Endoquantum Mechanics to him. Nishad was as intrigued as the researcher to see if the diamond model could be applied to this and they worked together to produce the diamond model of relative consciousness. This was just after talking and debating the consciousness model after food and to both of their surprise, while working together and continually referencing his book we were able to create a working model that visually shows the contemporary cultural context of the Theory of Relative Consciousness and also communicate visually in logical kinetics where relative consciousness sits in the matrixes produced by Ken Wilber for his Integral Theory (Dubashia, 2018)

This is now a key addition of a logical model and a visual element of what will be displayed finally through the researcher's exhibition.

Through application of Wilber's Four Quadrants it is clear to see that this research project and creative process has amalgamated into a well-fortified foundation for further research, conceptual development and philosophical study and consideration.



Fig, 15: The Fourth visual outcome for the project. The Diamond Model of Relative Consciousness and Endoquantum mechanics, first defined and created by Kai Holland and Nish Dubashia during the Science & Consciousness: WYRD World of Mind & Matter Conference in Broughton, York. During the week of the 14th to the 18th of November 2021.

Further: The continued use of this colour pallet brings all of the resulting prototype models together as one communicative effort and potentially a single learning journey. Along with the use of Helvetica for the main typeface, these models communicate important knowledge through visual diagrammatic style and via infographics developed through the fundamental graphic design processes of the researcher's praxis. There are also logical kinetics within the structure of the model that can only be imparted as knowledge through this kind of graphic design system.

IV. The nature of memory in glass form – An autological artefact.

Central to the understandings given in the prototype visual model for the conscious experience of the observer is the nature of visual memory being based on the nature of the light in the environment when experiencing any given event. This understanding is easily summarized by explaining that memory has the nature of photons. Photons are known to be massless light carrying quanta and it is estimated within the prototype visual model that this quantum data of photons is processed into endo-quantum data for awareness of any given scene, and as such, photons are considered integral to the mechanics of describing and appropriately defining Qualia. (Penrose, 1989, 1996, 2007, 2014).

A part of the research proposal for this project was to create a glass model of the first photograph taken of the wave/particle duality nature of light. This glass model is based directly on the research of Dr. Fabrizio Carbone and his team of researchers at EPFL, Switzerland (Carbone, 2016). The data from this experiment, which Dr Carbone was very happy to share with the researcher is the platform for developing this autological glass artefact.

Dr Carbone supplied all of the data from his research for considerations and use in the work and this was used this to create a number of clay models. These models were in fact too rough for the glass making process and so the researcher has decided that this

facet of the research project and creative reflections is something that would be better delayed for further research and development within an appropriate time frame at the higher Ph.D. level of study in the future.

As a creative resource, glass is a light carrier. It is a vessel of transportation for light and the photons that make up light. Therefore, it is reasoned by the researcher that if this model were achieved from the data supplied in that history making research at EPFL, it would be an autological artefact in that it carries the phenomena of the information it conveys in its form and material composition (Carbone, 2016).

The researcher has never used glass before or ever considered working in this realm. The researcher would like to point out that this creative glass piece project is a massive creative task within itself and its theoretical value as part of this contribution is beyond measure if actually completed. A creative journal and recorded journey of research is being logged as this continues to develop.

V. The observed experimental anomaly.

All of this learning has only been possible through firstly recording or attempting to record what the researcher perceives and puts forward as a Retrocausal feedback loop and thus an endoquantum anomaly in their autistic memory function. This is something the researcher believes to have been caused by the effects of experiencing psycho-traumatic events as a child and throughout their adolescence and early adulthood (Salmona, 2018). This now observed experimental anomaly has offered the researcher insights into the nature of consciousness and has been a driving force behind the learning achieved through the development of this project.

If the anomaly doesn't exist, how did the researcher then find these answers and explanations to align with everything that would make the anomaly possible?

Further, it is opined by those native to the Copenhagen Interpretation of consciousness, who are sceptics of Penrose and Hameroff that "there is no observed experimental anomaly" to ratify their claims. While it is then opined by Penrose that "new physics is needed to explain consciousness."

The researcher is keen to point out that an appropriate anomaly within a conscious mind could only ever become observed and then be appropriately identified for scientific and academic study by the conscious mind it occurs in.

Chapter 5 – Conclusion

> "The reading of all good books is like conversation with the finest men of past centuries." Rene Descartes (Descartes, 1637)

The researcher is keen to point out that the development of the processual learning and visual problem-solving praxis has been immersive and consistently challenging. These challenges have been met with obsession, passion and an open and pragmatic mind and it has been a thoroughly enlightening learning journey of gaining pure understanding through fundamental research and through a developing professional praxis in the attempt to make an academic contribution to knowledge.

The discovery of the appropriate definition of endoquantum mechanics in relation to quantum systems that operate within biological systems has been seminal. The collation of this understanding in the models stands to communicate the science at play in facilitating the conscious experience of the observer. This crucial learning and fundamental understanding were achieved through reading the primary and secondary resources of Penrose and Hameroff and other scientists working within the same field of research, which is gaining credence as we learn more about this fascinating topic (Volk, 2018). This learning and understanding were also achieved through the visual problem-solving processes and the continual development of the diagrammatic communication of the idea through the visual modelling process of graphic design. Graphic Design techniques and tools were used to amalgamate a well-reasoned and informed visual hypothesis that is conveyed through the creative visual models and based on these emergent physics principles.

Being based on these emergent theories, what has been discovered with the resulting visual models is arguably the first visual mode in history to attempt through the

academic research process and application of critical thinking through art and design processes, to quantify the conscious experience of the observer.

> "And thus, the actions of life often not allowing any delay, it is a truth very certain that, when it is not in our power to determine the truest opinions, we ought to follow the most probable." – Rene Descartes (Descartes, 1637).

We have to consider the scientific method, as applied through the development of these graphic design solutions for these scientific and philosophical problems, as described by Descartes and referenced earlier in this writing. It is fair to say that the research has remained sceptical of everything and maintained the established standard for cartesian doubt. It is also fair to say that from all modes of thought experiments the idea contained and communicated by the visual outcomes of this research are indeed scientific and have scientific qualities, it is argued that in consideration of the case studies and literature review, they may even have scientific rigour and validity. The decisions made to focus on the work of Penrose & Hameroff have helped to then focus the proposed theory of endoquantum mechanics on a developing and emergent but none the less widely supported while still being a deeply contentious idea.

The research has also needed to make sense of cartesian duality, in terms of then being able to build on this simple idea through the resulting visual hypothesis. The work is centred on epistemology through visual communication and a thorough literature review has led to greater understandings "Moving slowly." And "sticking to the straight road." To arrive at a point where I the researcher has then had to follow a point of "what is most probable?" in consideration of everything available.

In conclusion for this research project the researcher feels all objectives have been satisfied in creating a working prototype model of that conscious experience of the observer based on all available information and resources and understandings currently

available. The information within the amalgamated models stand as a prototype visual hypothesis and visual model of the conscious experience of the observer. It is a Higher Order Theory of consciousness as attention to memory that operates within and beyond all of the prescribed domains highlighted through the Penrose interpretation of consciousness. It is then argued by the researcher that it collectively stands as a reasonable follow on from gaining an in depth understanding of the Penrose Interpretation of consciousness and relating those understandings to insights gained from observing a retrocausal endoquantum anomaly in their autistic memory function, to a visual creative problem solving process for finding ways to appropriately communicate the nature of and the physical behaviour of that anomaly.

.

Finally,

To consider the models and what they suggest about the nature of our conscious experience as observers, after the research journey and then as a collective research project within the fields of visual scientific modelling is inspiring as they stand to fuel and fortify a platform for further research with promise of more understanding and further creative and intellectual collaborations. This will be an opportunity to take the prototype models to that next stage of academic enquiry and to address them with deeper scrutiny within the scope of the academic and scientific lenses. The researcher would argue that this would conclude this research project as largely successful in terms of what it has to offer as a potential contribution to knowledge through the many aspects of understanding the application of endoquantum mechanics offers when considering the conscious experience of the observer and the role of graphic design in science and science communication. Also, it resonates as a basis for making further contributions through

further research and development with the processual practice of visual problem solving through graphic design processes.

This process has, overall, served to validate the role of the designer and the value of design and visual communication within science education and science communication. Collectively the project and the suggested discoveries from the processual fundamental research process through visual problem solving validates the role of creativity and the importance of visual communication and visual thinking in science and offers insight towards the potentials for visual thinkers, practitioners and designers within real world problem solving through the sciences, art and design. The best thing about it for the researcher is that the research aim and findings have remained coherent through the processual learning and although endoquantum mechanics could possibly be a fact it is the visualisation of Endoquantum mechanics as a process of learning and development through graphic design which was not only key for understanding but is the overall contribution from this research process.

Mae llif yr afon yn siarad I fi,

Es i'r mynudd a'r glyn,

Trwy'r hiraeth yn fy nghalon,

Ry'n ni yma o hyd,

Fel gwaed ar yr eira gwyn.

This dissertation is dedicated to the memory of my grandparents, Charles & Elizabeth Whitfield for their amazing cosmic bearings on creating my existence and giving me the ability to truly observe. It is also in honour of the memory of Mrs. Jackson, who helped me translate the above poem from my understanding of the English words I could see in my head in to rhyming Welsh in 1996, and to whom I promised on my heart in light of the cosmos that no matter what happens along the way, this would happen.

Wales forever!

Universe debateable.

Sui Generis.

Per Aspera Ad Astra.

Index of Images

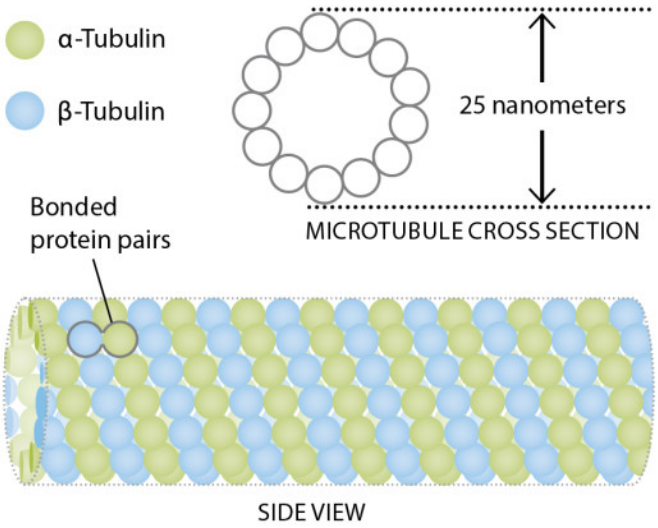


Fig1.

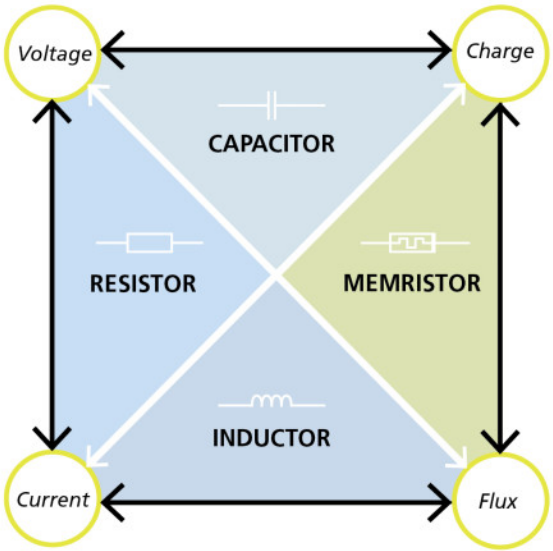


Fig 2

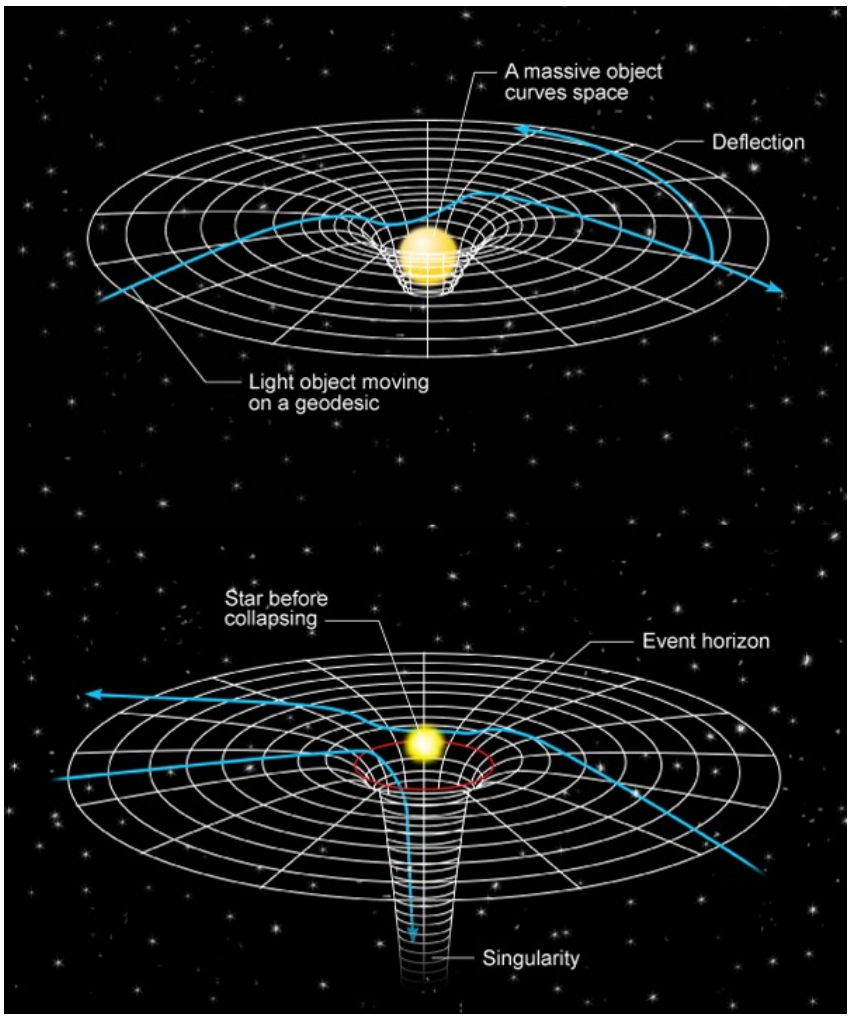

A massive object
curves space
Deflection
Light object moving
on a geodesic
Star before
collapsing
Event horizon
Singularity

Fig. 3

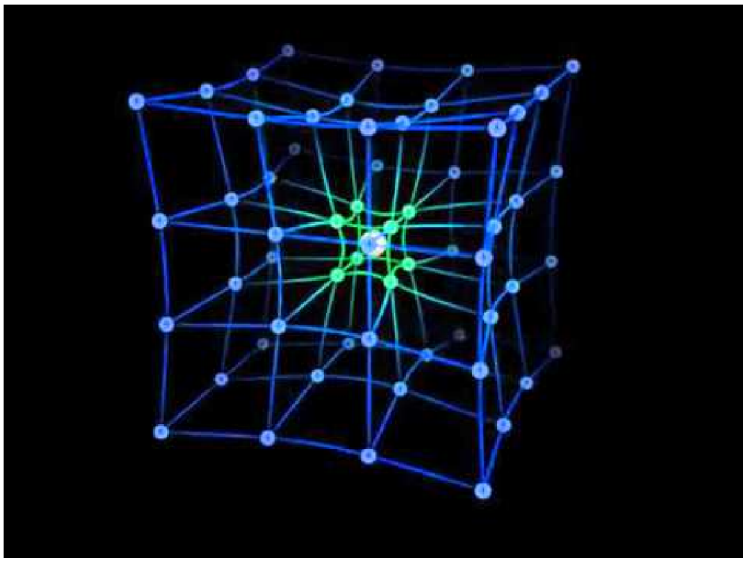


Fig. 4

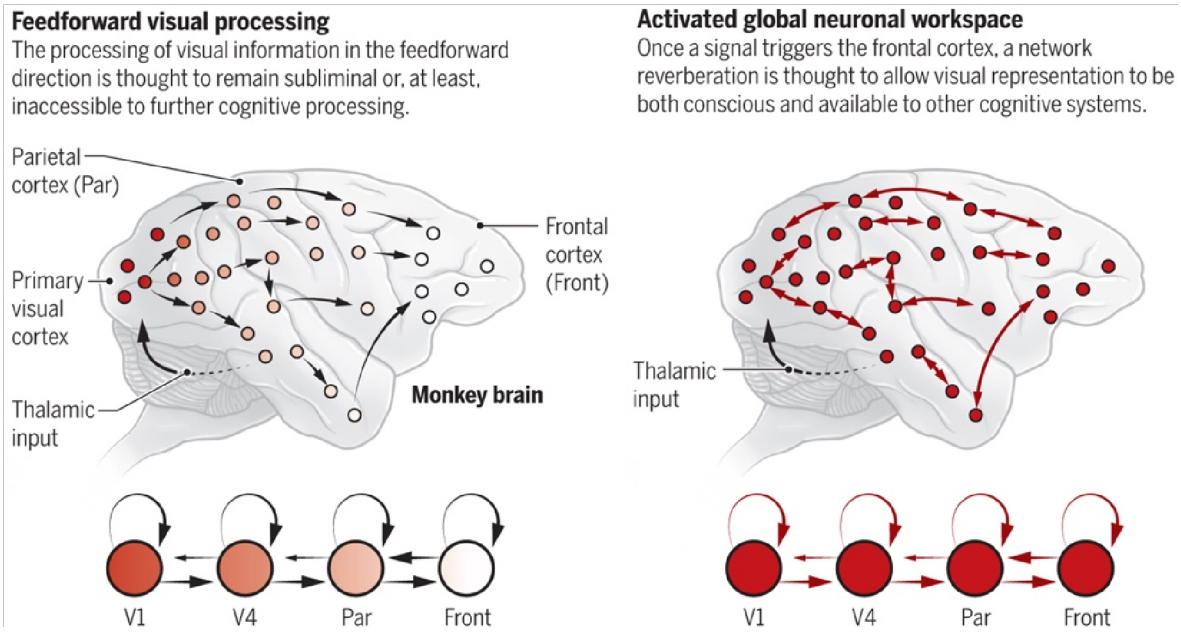

Feedforward visual processing
The processing of visual information in the feedforward direction is thought to remain subliminal or, at least, inaccessible to further cognitive processing.
Parietal cortex (Par)
Primary visual cortex
Thalamic input
Frontal cortex (Front)
Monkey brain
V1
V4
Par
Front
Activated global neuronal workspace
Once a signal triggers the frontal cortex, a network reverberation is thought to allow visual representation to be both conscious and available to other cognitive systems.
Thalamic input
V1
V4
Par
Front

Fig. 5.

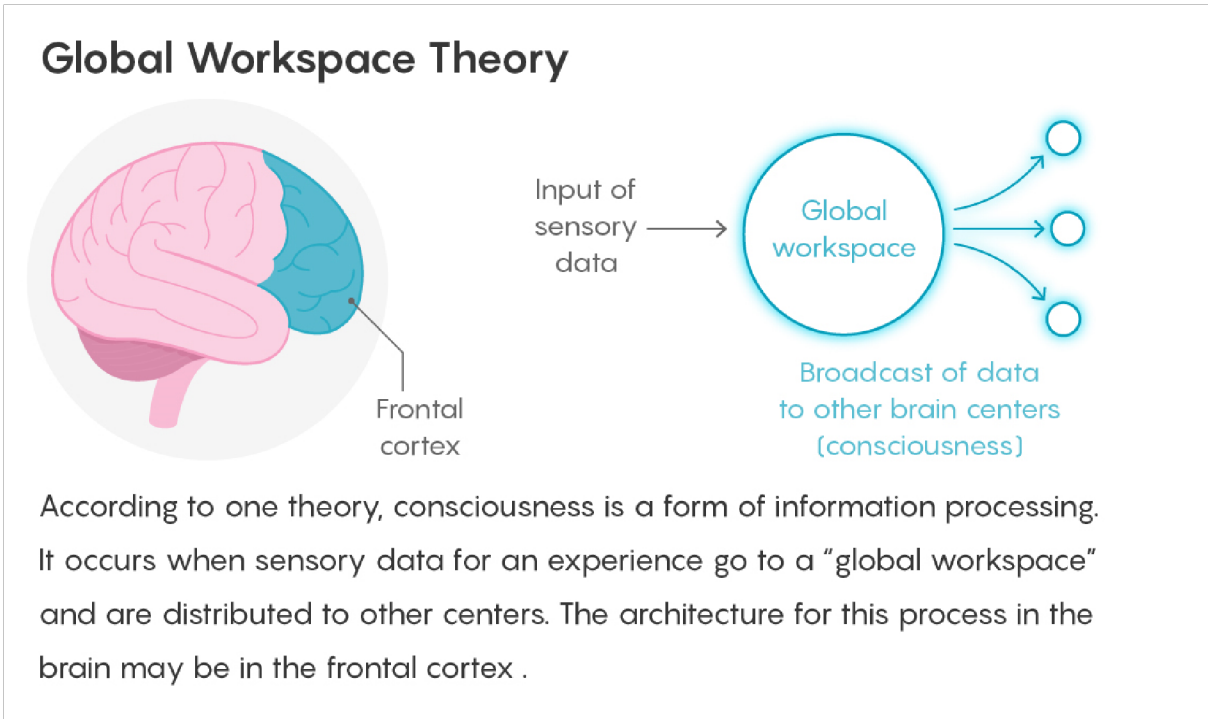

Global Workspace Theory
Frontal cortex
Input of sensory data
Global workspace
Broadcast of data to other brain centers (consciousness)
According to one theory, consciousness is a form of information processing. It occurs when sensory data for an experience go to a "global workspace" and are distributed to other centers. The architecture for this process in the brain may be in the frontal cortex .

Fig.6.

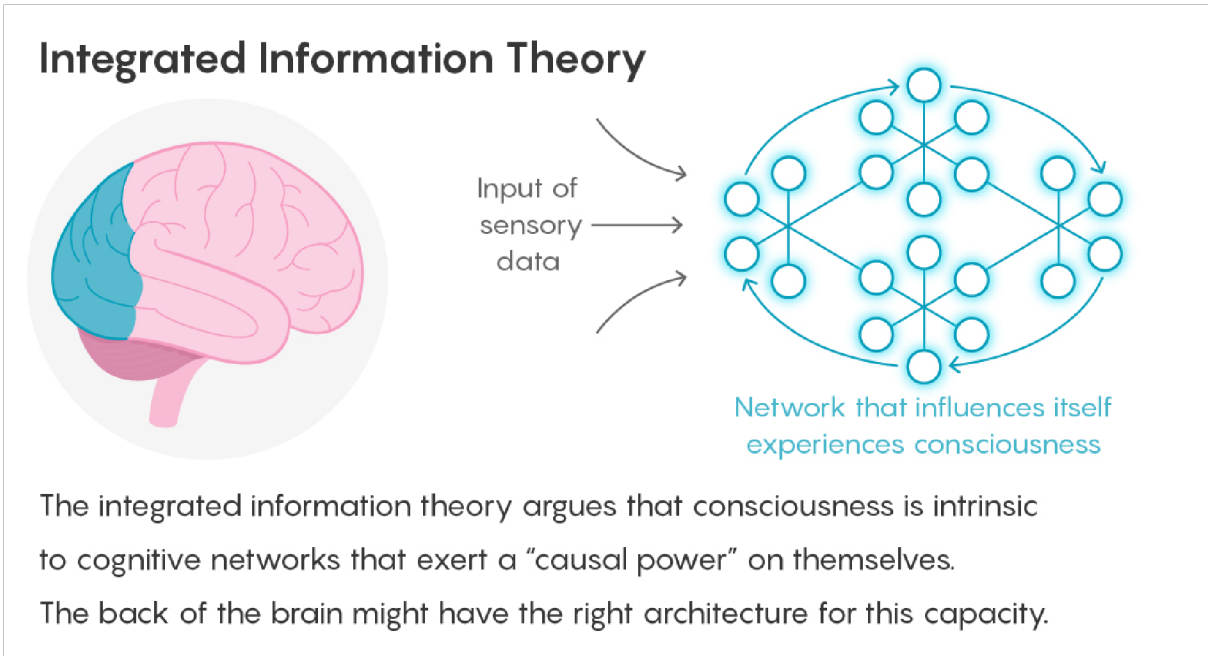

Integrated Information Theory
Input of sensory data
Network that influences itself experiences consciousness
The integrated information theory argues that consciousness is intrinsic to cognitive networks that exert a "causal power" on themselves.
The back of the brain might have the right architecture for this capacity.

Fig. 7

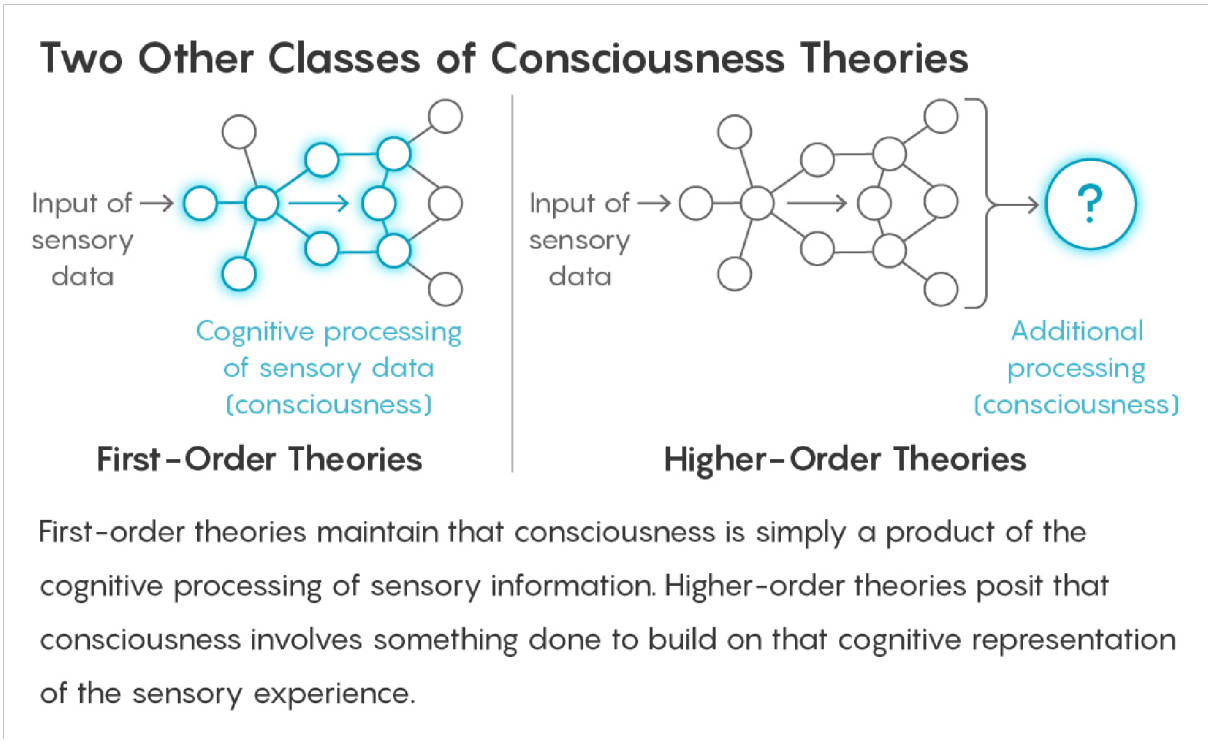

Two Other Classes of Consciousness Theories
Input of sensory data
Cognitive processing of sensory data (consciousness)
First-Order Theories
Input of sensory data
?
Additional processing (consciousness)
Higher-Order Theories
First-order theories maintain that consciousness is simply a product of the cognitive processing of sensory information. Higher-order theories posit that consciousness involves something done to build on that cognitive representation of the sensory experience.

Fig. 8.

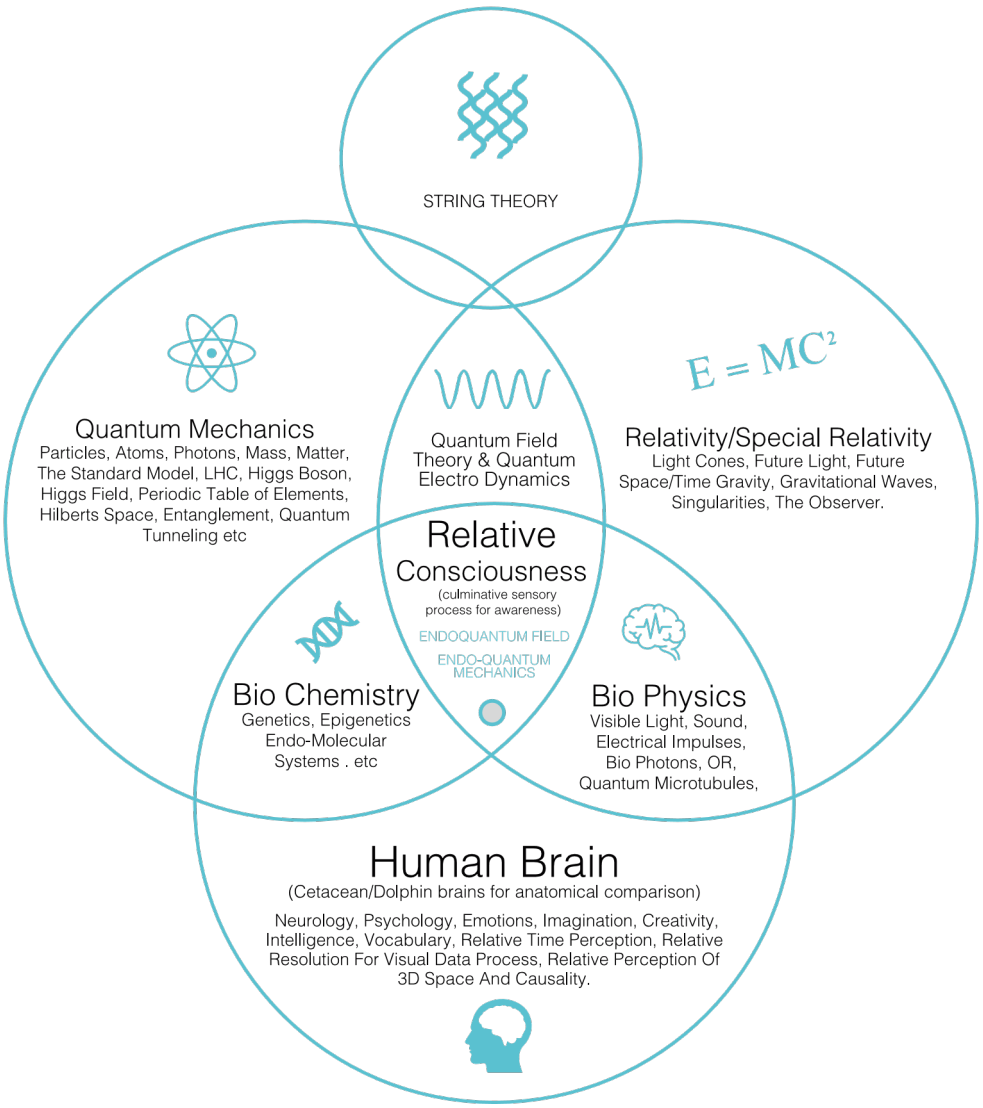

STRING THEORY
Quantum Mechanics
Particles, Atoms, Photons, Mass, Matter, The Standard Model, LHC, Higgs Boson, Higgs Field, Periodic Table of Elements, Hilberts Space, Entanglement, Quantum Tunneling etc
Quantum Field Theory & Quantum Electro Dynamics
E = MC²
Relativity/Special Relativity
Light Cones, Future Light, Future Space/Time Gravity, Gravitational Waves, Singularities, The Observer.
Relative Consciousness
(culminative sensory process for awareness)
ENDOQUANTUM FIELD
ENDO-QUANTUM MECHANICS
Bio Chemistry
Genetics, Epigenetics Endo-Molecular Systems . etc
Bio Physics
Visible Light, Sound, Electrical Impulses, Bio Photons, OR, Quantum Microtubules,
Human Brain
(Cetacean/Dolphin brains for anatomical comparison)
Neurology, Psychology, Emotions, Imagination, Creativity, Intelligence, Vocabulary, Relative Time Perception, Relative Resolution For Visual Data Process, Relative Perception Of 3D Space And Causality.

Fig 9:

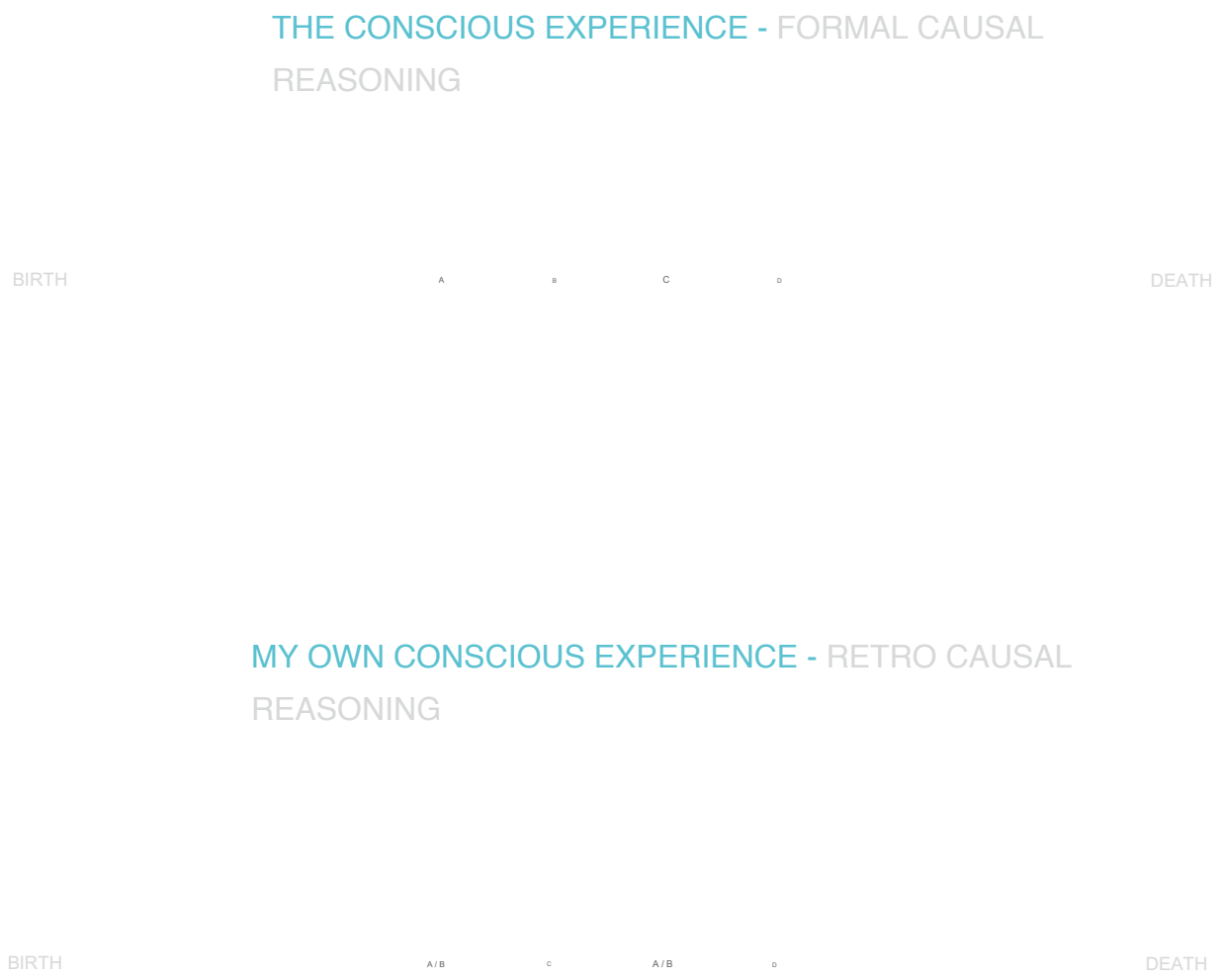

THE CONSCIOUS EXPERIENCE - FORMAL CAUSAL REASONING
BIRTH
A
B
C
D
DEATH
MY OWN CONSCIOUS EXPERIENCE - RETRO CAUSAL REASONING
BIRTH
A / B
C
A / B
D
DEATH

Fig 10:

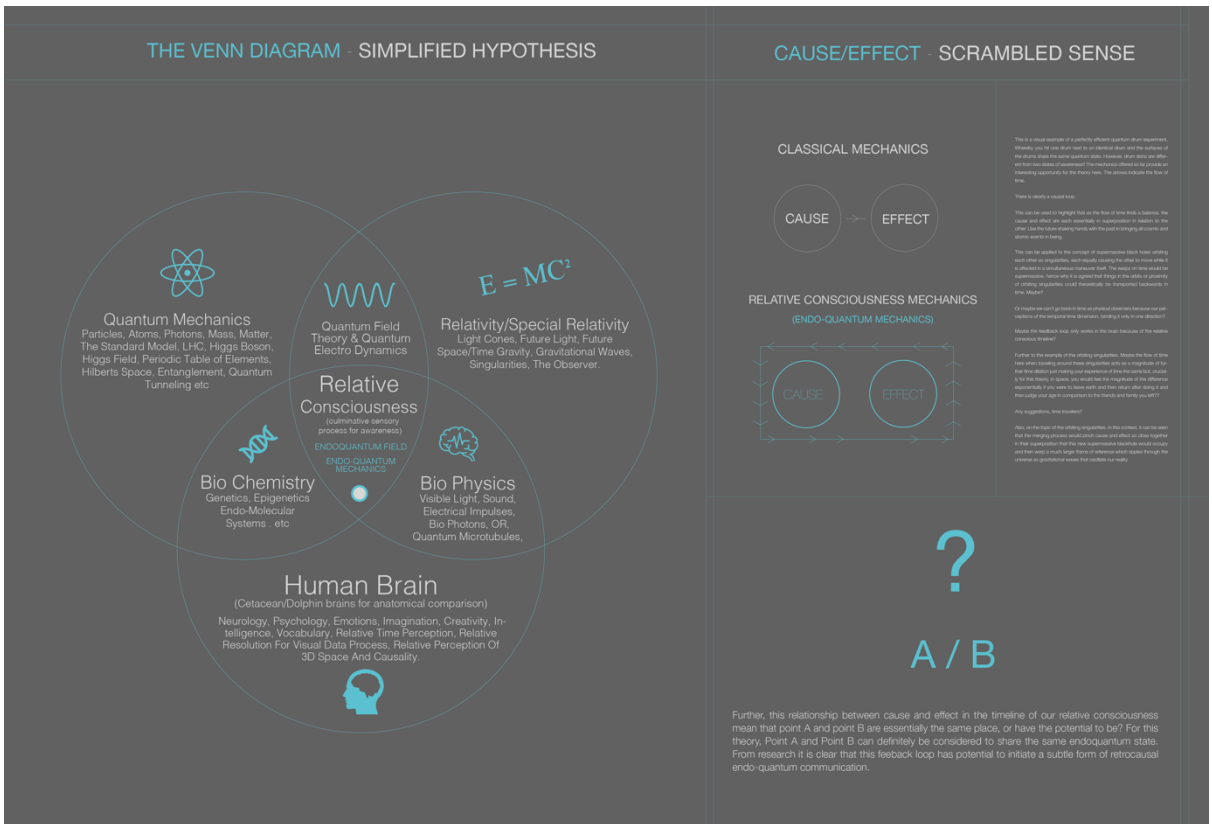

THE VENN DIAGRAM - SIMPLIFIED HYPOTHESIS
Quantum Mechanics
Particles, Atoms, Photons, Mass, Matter, The Standard Model, LHC, Higgs Boson, Higgs Field, Periodic Table of Elements, Hilberts Space, Entanglement, Quantum Tunneling etc
Quantum Field Theory & Quantum Electro Dynamics
E = MC²
Relativity/Special Relativity
Light Cones, Future Light, Future - Space/Time Gravity, Gravitational Waves, Singularities, The Observer.
Relative Consciousness
(culminative sensory process for awareness)
ENDOQUANTUM FIELD
ENDO-QUANTUM MECHANICS
Bio Chemistry
Genetics, Epigenetics Endo-Molecular Systems . etc
Bio Physics
Visible Light, Sound, Electrical Impulses, Bio Photons, OR, Quantum Microtubules,
Human Brain
(Cetacean/Dolphin brains for anatomical comparison)
Neurology, Psychology, Emotions, Imagination, Creativity, Intelligence, Vocabulary, Relative Time Perception, Relative Resolution For Visual Data Process, Relative Perception Of 3D Space And Causality.
CAUSE/EFFECT - SCRAMBLED SENSE
CLASSICAL MECHANICS
CAUSE
EFFECT
RELATIVE CONSCIOUSNESS MECHANICS
(ENDO-QUANTUM MECHANICS)
CAUSE
EFFECT
?
A / B
Further, this relationship between cause and effect in the timeline of our relative consciousness mean that point A and point B are essentially the same place, or have the potential to be? For this theory, Point A and Point B can definitely be considered to share the same endoquantum state. From research it is clear that this feeback loop has potential to initiate a subtle form of retrocausal endo-quantum communication.

Fig11:

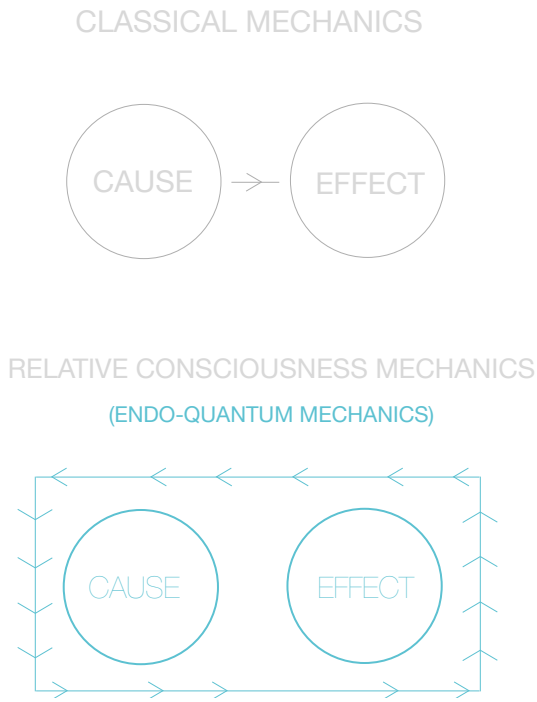

CLASSICAL MECHANICS
CAUSE
EFFECT
RELATIVE CONSCIOUSNESS MECHANICS
(ENDO-QUANTUM MECHANICS)
CAUSE
EFFECT

Fig 12:

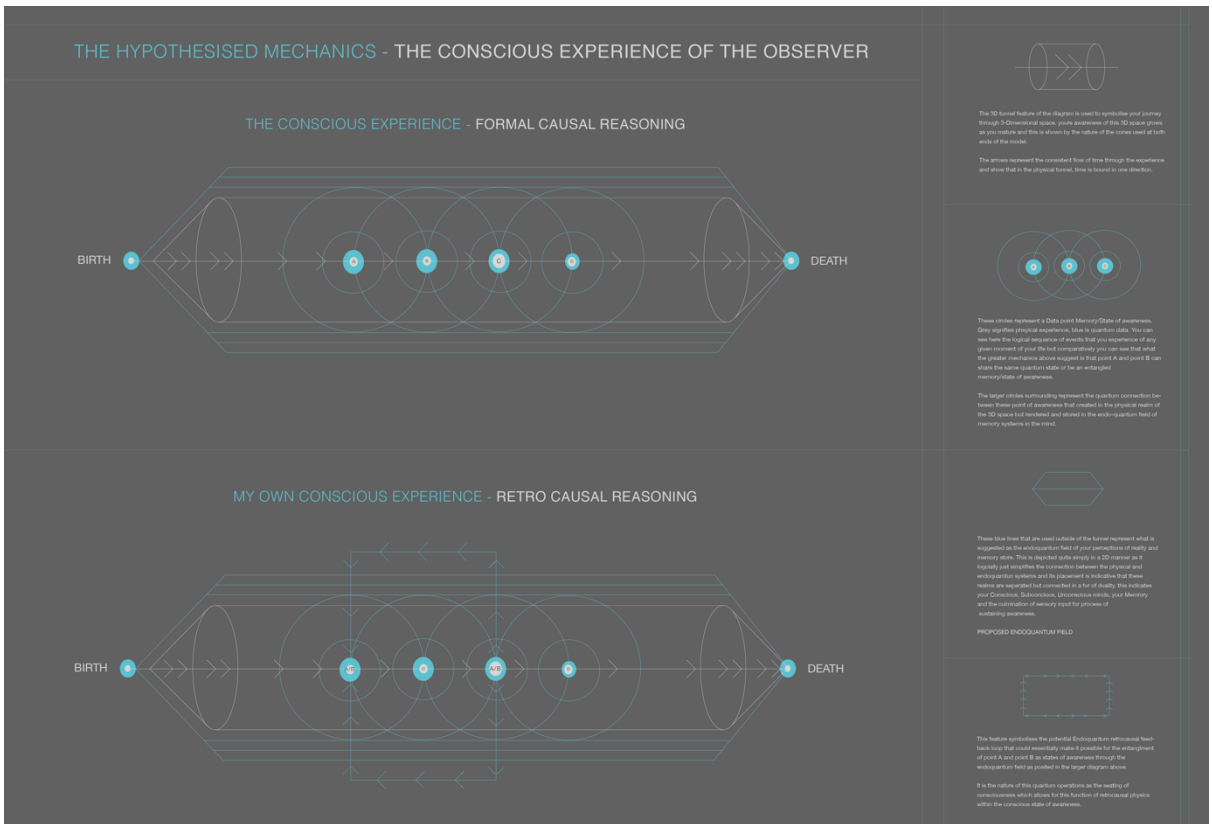

THE HYPOTHESISED MECHANICS - THE CONSCIOUS EXPERIENCE OF THE OBSERVER
THE CONSCIOUS EXPERIENCE - FORMAL CAUSAL REASONING
BIRTH
DEATH
MY OWN CONSCIOUS EXPERIENCE - RETRO CAUSAL REASONING
BIRTH
DEATH
PROPOSED ENDOQUANTUM FIELD

Fig 13:

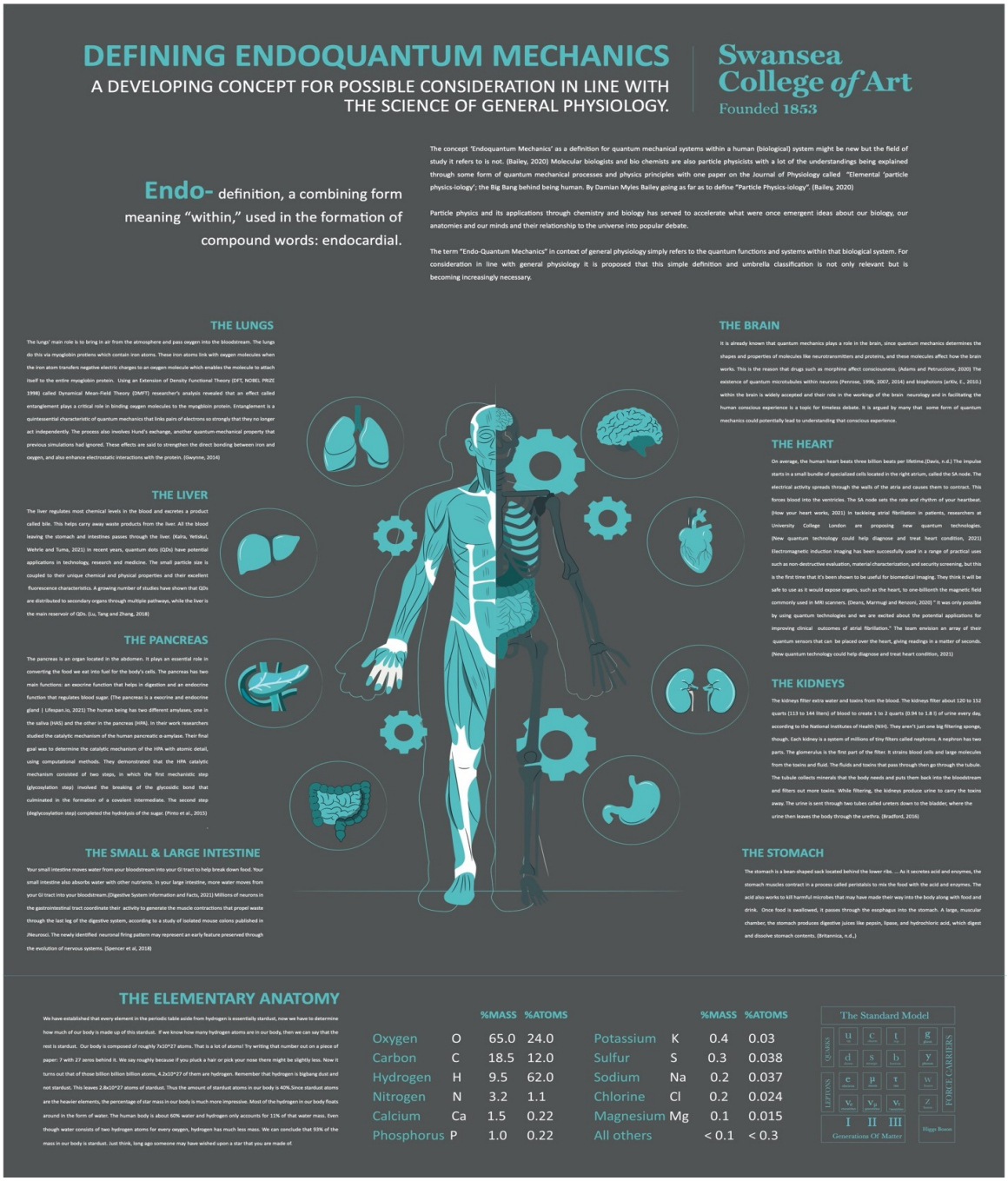
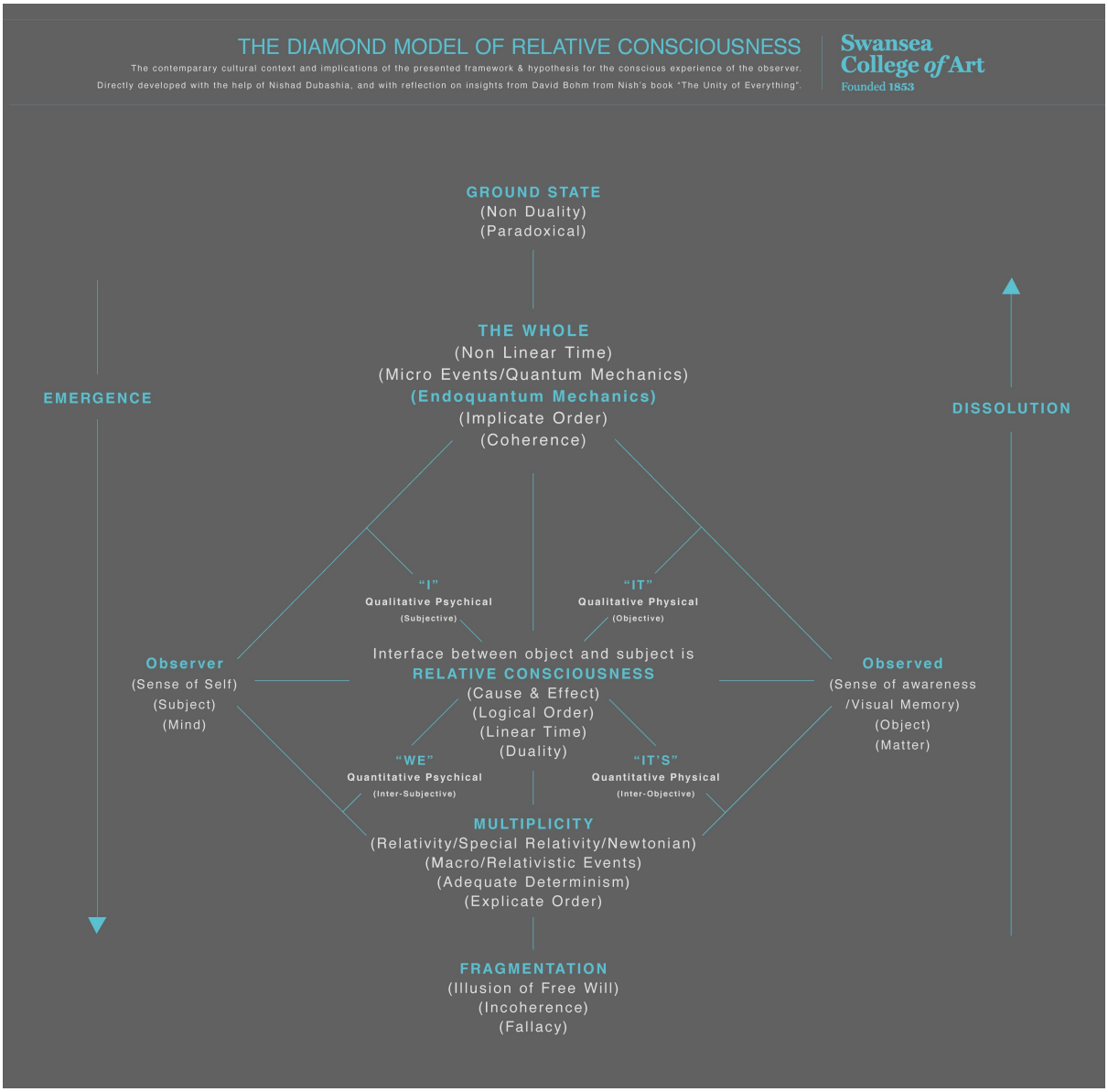

DEFINING ENDOQUANTUM MECHANICS
A DEVELOPING CONCEPT FOR POSSIBLE CONSIDERATION IN LINE WITH THE SCIENCE OF GENERAL PHYSIOLOGY.
Swansea College of Art
Founded 1853
Endo- definition, a combining form meaning "within," used in the formation of compound words: endocardial.
The concept 'Endoquantum Mechanics' as a definition for quantum mechanical systems within a human (biological) system might be new but the field of study it refers to is not. (Bailey, 2020) Molecular biologists and bio chemists are also particle physicists with a lot of the understandings being explained through some form of quantum mechanical processes and physics principles with one paper on the Journal of Physiology called "Elemental 'particle physics-iology'; the Big Bang behind being human. By Damian Myles Bailey going as far as to define "Particle Physics-iology". (Bailey, 2020)
Particle physics and its applications through chemistry and biology has served to accelerate what were once emergent ideas about our biology, our anatomies and our minds and their relationship to the universe into popular debate.
The term "Endo-Quantum Mechanics" in context of general physiology simply refers to the quantum functions and systems within that biological system. For consideration in line with general physiology it is proposed that this simple definition and umbrella classification is not only relevant but is becoming increasingly necessary.
THE LUNGS
The lungs' main role is to bring in air from the atmosphere and pass oxygen into the bloodstream. The lungs do this via myoglobin proteins which contain iron atoms. These iron atoms link with oxygen molecules when the iron atom transfers negative electric charges to an oxygen molecule which enables the molecule to attach itself to the entire myoglobin protein. Using an Extension of Density Functional Theory (DFT, NOBEL PRIZE 1998) called Dynamical Mean-Field Theory (DMFT) researcher's analysis revealed that an effect called entanglement plays a critical role in binding oxygen molecules to the myoglobin protein. Entanglement is a quintessential characteristic of quantum mechanics that links pairs of electrons so strongly that they no longer act independently. The process also involves Hund's exchange, another quantum-mechanical property that previous simulations had ignored. These effects are said to strengthen the direct bonding between iron and oxygen, and also enhance electrostatic interactions with the protein. (Gwynne, 2014)
THE LIVER
The liver regulates most chemical levels in the blood and excretes a product called bile. This helps carry away waste products from the liver. All the blood leaving the stomach and intestines passes through the liver. (Kaira, Yetiskul, Wehrle and Tuma, 2021) In recent years, quantum dots (QDs) have potential applications in technology, research and medicine. The small particle size is coupled to their unique chemical and physical properties and their excellent fluorescence characteristics. A growing number of studies have shown that QDs are distributed to secondary organs through multiple pathways, while the liver is the main reservoir of QDs. (Liu, Tang and Zhang, 2018)
THE PANCREAS
The pancreas is an organ located in the abdomen. It plays an essential role in converting the food we eat into fuel for the body's cells. The pancreas has two main functions: an exocrine function that helps in digestion and an endocrine function that regulates blood sugar. (The pancreas is a exocrine and endocrine gland | Lifespan.io, 2021) The human being has two different amylases, one in the saliva (HAS) and the other in the pancreas (HPA). In their work researchers studied the catalytic mechanism of the human pancreatic α-amylase. Their final goal was to determine the catalytic mechanism of the HPA with atomic detail, using computational methods. They demonstrated that the HPA catalytic mechanism consisted of two steps, in which the first mechanistic step (glycosylation step) involved the breaking of the glycosidic bond that culminated in the formation of a covalent intermediate. The second step (deglycosylation step) completed the hydrolysis of the sugar. (Pinto et al., 2015)
THE SMALL & LARGE INTESTINE
Your small intestine moves water from your bloodstream into your GI tract to help break down food. Your small intestine also absorbs water with other nutrients. In your large intestine, more water moves from your GI tract into your bloodstream.(Digestive System Information and Facts, 2021) Millions of neurons in the gastrointestinal tract coordinate their activity to generate the muscle contractions that propel waste through the last leg of the digestive system, according to a study of isolated mouse colons published in /Neurosci. The newly identified neuronal firing pattern may represent an early feature preserved through the evolution of nervous systems. (Spencer et al, 2018)
THE BRAIN
It is already known that quantum mechanics plays a role in the brain, since quantum mechanics determines the shapes and properties of molecules like neurotransmitters and proteins, and these molecules affect how the brain works. This is the reason that drugs such as morphine affect consciousness. (Adams and Petruccione, 2020) The existence of quantum microtubules within neurons (Penrose, 1996, 2007, 2014) and biophotons (arXiv, E., 2010.) within the brain is widely accepted and their role in the workings of the brain neurology and in facilitating the human conscious experience is a topic for timeless debate. It is argued by many that some form of quantum mechanics could potentially lead to understanding that conscious experience.
THE HEART
On average, the human heart beats three billion beats per lifetime.(Davis, n.d.) The impulse starts in a small bundle of specialized cells located in the right atrium, called the SA node. The electrical activity spreads through the walls of the atria and causes them to contract. This forces blood into the ventricles. The SA node sets the rate and rhythm of your heartbeat. (How your heart works, 2021) In tackling atrial fibrillation in patients, researchers at University College London are proposing new quantum technologies. (New quantum technology could help diagnose and treat heart condition, 2021) Electromagnetic induction imaging has been successfully used in a range of practical uses such as non-destructive evaluation, material characterization, and security screening, but this is the first time that it's been shown to be useful for biomedical imaging. They think it will be safe to use as it would expose organs, such as the heart, to one-billionth the magnetic field commonly used in MRI scanners. (Deans, Marmugi and Renzoni, 2020) " It was only possible by using quantum technologies and we are excited about the potential applications for improving clinical outcomes of atrial fibrillation." The team envision an array of their quantum sensors that can be placed over the heart, giving readings in a matter of seconds. (New quantum technology could help diagnose and treat heart condition, 2021)
THE KIDNEYS
The kidneys filter extra water and toxins from the blood. The kidneys filter about 120 to 152 quarts (113 to 144 liters) of blood to create 1 to 2 quarts (0.94 to 1.8 l) of urine every day, according to the National Institutes of Health (NIH). They aren't just one big filtering sponge, though. Each kidney is a system of millions of tiny filters called nephrons. A nephron has two parts. The glomerulus is the first part of the filter. It strains blood cells and large molecules from the toxins and fluid. The fluids and toxins that pass through then go through the tubule. The tubule collects minerals that the body needs and puts them back into the bloodstream and filters out more toxins. While filtering, the kidneys produce urine to carry the toxins away. The urine is sent through two tubes called ureters down to the bladder, where the urine then leaves the body through the urethra. (Bradford, 2016)
THE STOMACH
The stomach is a bean-shaped sack located behind the lower ribs. ... As it secretes acid and enzymes, the stomach muscles contract in a process called peristalsis to mix the food with the acid and enzymes. The acid also works to kill harmful microbes that may have made their way into the body along with food and drink. Once food is swallowed, it passes through the esophagus into the stomach. A large, muscular chamber, the stomach produces digestive juices like pepsin, lipase, and hydrochloric acid, which digest and dissolve stomach contents. (Britannica, n.d.)
THE ELEMENTARY ANATOMY
We have established that every element in the periodic table aside from hydrogen is essentially stardust, now we have to determine how much of our body is made up of this stardust. If we know how many hydrogen atoms are in our body, then we can say that the rest is stardust. Our body is composed of roughly 7x10^27 atoms. That is a lot of atoms! Try writing that number out on a piece of paper: 7 with 27 zeros behind it. We say roughly because if you pluck a hair or pick your nose there might be slightly less. Now it turns out that of those billion billion billion atoms, 4.2x10^27 of them are hydrogen. Remember that hydrogen is bigbang dust and not stardust. This leaves 2.8x10^27 atoms of stardust. Thus the amount of stardust atoms in our body is 40%.Since stardust atoms are the heavier elements, the percentage of star mass in our body is much more impressive. Most of the hydrogen in our body floats around in the form of water. The human body is about 60% water and hydrogen only accounts for 11% of that water mass. Even though water consists of two hydrogen atoms for every oxygen, hydrogen has much less mass. We can conclude that 93% of the mass in our body is stardust. Just think, long ago someone may have wished upon a star that you are made of.
%MASS %ATOMS
Oxygen O 65.0 24.0
Carbon C 18.5 12.0
Hydrogen H 9.5 62.0
Nitrogen N 3.2 1.1
Calcium Ca 1.5 0.22
Phosphorus P 1.0 0.22
%MASS %ATOMS
Potassium K 0.4 0.03
Sulfur S 0.3 0.038
Sodium Na 0.2 0.037
Chlorine Cl 0.2 0.024
Magnesium Mg 0.1 0.015
All others < 0.1 < 0.3
The Standard Model
QUARKS
LEPTONS
FORCE CARRIERS
I II III
Generations Of Matter
Higgs Boson

Fig. 14:


THE DIAMOND MODEL OF RELATIVE CONSCIOUSNESS
The contemparary cultural context and implications of the presented framework & hypothesis for the conscious experience of the observer.
Directly developed with the help of Nishad Dubashia, and with reflection on insights from David Bohm from Nish's book "The Unity of Everything".
Swansea College of Art
Founded 1853
GROUND STATE
(Non Duality)
(Paradoxical)
THE WHOLE
(Non Linear Time)
(Micro Events/Quantum Mechanics)
(Endoquantum Mechanics)
(Implicate Order)
(Coherence)
EMERGENCE
DISSOLUTION
"I"
Qualitative Psychical
(Subjective)
"IT"
Qualitative Physical
(Objective)
Observer
(Sense of Self)
(Subject)
(Mind)
Interface between object and subject is
RELATIVE CONSCIOUSNESS
(Cause & Effect)
(Logical Order)
(Linear Time)
(Duality)
Observed
(Sense of awareness
/Visual Memory)
(Object)
(Matter)
"WE"
Quantitative Psychical
(Inter-Subjective)
"IT'S"
Quantitative Physical
(Inter-Objective)
MULTIPLICITY
(Relativity/Special Relativity/Newtonian)
(Macro/Relativistic Events)
(Adequate Determinism)
(Explicate Order)
FRAGMENTATION
(Illusion of Free Will)
(Incoherence)
(Fallacy)

Fig, 15:

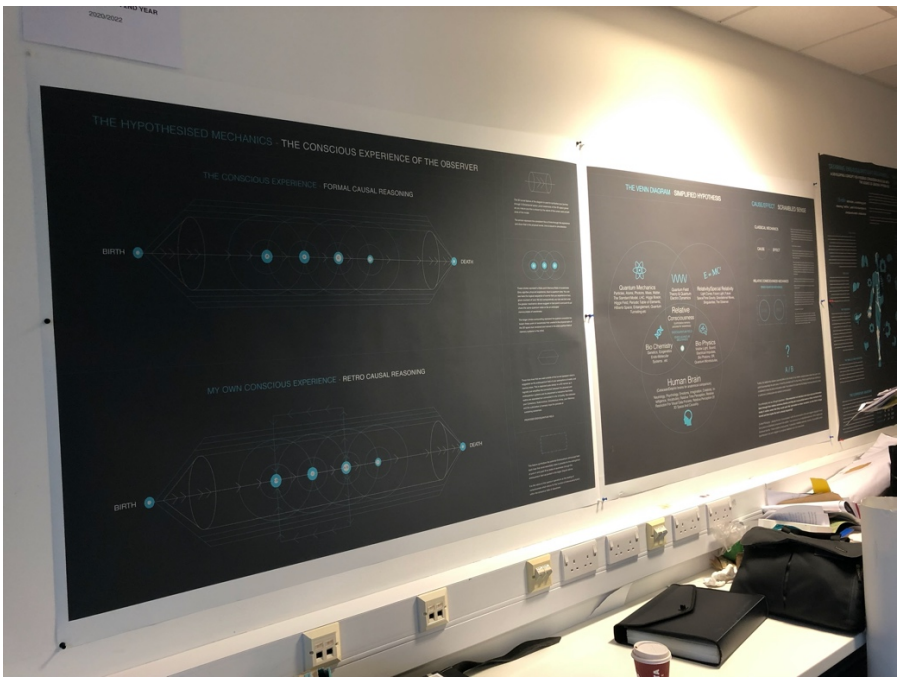

THE HYPOTHESISED MECHANICS - THE CONSCIOUS EXPERIENCE OF THE OBSERVER
THE CONSCIOUS EXPERIENCE - FORMAL CAUSAL REASONING
BIRTH
DEATH
MY OWN CONSCIOUS EXPERIENCE - RETRO CAUSAL REASONING
BIRTH
DEATH
THE VENN DIAGRAM - SIMPLIFIED HYPOTHESIS
Quantum Mechanics
Relativity
Relative Consciousness
Bio Chemistry
Bio Physics
Human Brain
?
A/B

Fig 16:


DEFINING ENDOQUANTUM MECHANICS
A DEVELOPING CONCEPT FOR POSSIBLE CONSIDERATION IN LINE WITH THE SCIENCE OF GENERAL PHYSIOLOGY.
Swansea College of Art
THE BRAIN
THE HEART
THE KIDNEYS
THE STOMACH
THE ELEMENTARY ANATOMY
?
A/B

Fig 17:

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Appendices

Interview Transcripts

Interview 1 with Nishad Cote

Discussing our diamond model of relative consciousness and applying relativity theory and quantum mechanics.

KAI 0:05
I wish sorry about that. We finally hear. Yes. Brilliant. So would you like to crack on and hash out some of the diamond model that we've been working on since the conference?

NISH 0:20
Yes, let's do that. So if you bring up the screen of the diamond model, then let's go through each component briefly and make sure that it all holds together. Okay, great. So do you want to like just give a quick two minute intro to what it is you're doing here? Yes. Why is it doing this?

KAI 0:45
I've been working on my master by research in art and design, which is geared in visual modelling. And I've decided to focus on STEM topics, namely the physics of consciousness, and trying to visually communicate a visual model of consciousness. Part of that process was to create, what is the theory of relative consciousness and all of the visuals that have come from the research and the mechanics, and the theoretical framework is all visual modelling, you know, so it all collects together as if we're framework of theory to communicate this idea that I've come or deduced from what I've been reading, from my literature review as part of my research. So the theory of relative consciousness is a number of different visuals, there's a mechanic section, there's a Venn diagram, there's a number of different visual kinetics for explaining the idea, full terms of physics, for people to understand the idea and how in a place, and I was lucky enough to meet you at a conference. And after your amazing talk on the diamond model, I've found some coherences in my mind with what you were communicating as a system of. It's basically a system of cosmology. And I realised that my idea might apply to this, and I was lucky enough to have you sit with me. And we were able to hash out a basic idea of what is on screen now within an hour, it was quite enlightening. Yes, so we've arrived now after a number of intellectual and creative interfaces and few chats. And this is the digitised version of what we created that night with a little bit more complexity. But it's showing some brilliant potential as part of my research now. And my lecturer said, that was my the supervisor for my research who said that this is the outcome for my research now, because this encompasses everything in the other models together in a way where I can explain the emergence of this kind of cosmology and where the idea would fit and where the cultural kinetics can be compared to others and other civilizations or other ways of living of the cosmologies. And, yeah, that's basically how we've come to this diamond model of relative consciousness as part of my research. So I want to thank you for that. Again. I'd like gold to be eternally grateful for this contribution for my work, and very much looking forward to now hashing out these ideas and making sure that we've got it on record with us logically going through these pieces and making sure that it does actually stand up.

NISH 4:28
Great, yes. Okay, so why don't we, if we start with multiplicity, that's the level I usually start with when I'm introducing the diamond model to people. Because that's, that's the level that most people live at, and can understand most easily. Okay, so let's start with that and look at some of these correspondences that were found. So we've got the Newtonian relativity and special relativity paradigms there. Yes. So I would say the Newtonian works most obviously, well, because the Newtonian worldview is that the world is made up of separate parts which relate to each other through relatively constant laws, the laws of motion laws of gravity, the laws of light, the way that light works, okay? So we have a three dimensional world that's working in a relatively mechanistic way. Where everything is pretty much predictable what's going to happen? So I think the Newtonian world matches onto multiplicity very well, then I should actually go back I didn't properly say what multiplicity is. multiplicity, basically, is a three dimensional world of space time, made up of separate parts of separate things, separate events, which interact with each other, purely at that level of parts. So yeah, as I've just explained, the Newtonian paradigm actually fits that extremely well. So I mean, I'll stop there does anything to add to that? Does that make sense? Yes,
KAI
6:20
it does. Yeah, absolutely. Yes, definitely. Because of the the Newtonian way of thinking is, and the way of obviously, mathematics then applied mathematics. This is what then, obviously, gives me the idea that relativity and special relativity are also part of that Newtonian understanding for us now. In contemporary culture, we will be speaking about relativity, rather than Newtonian wouldn't be, I think.

NISH 7:00
Yes, I agree that, yeah, in some cases, yes. I mean, I think what, what what happened with Einstein is that the Newtonian model still works very well, much of the time, but there are going to be certain cases where it starts to break down. So for example, the relationship between two objects in motion relative to one another, or what happens to an object, as it becomes goes faster and faster and approaches the speed of light? What happens to time? When it what what, how is time relative between, say, someone standing still, and someone in in motion relative to the person who's standing still, when it these kinds of considerations? The Newtonian worldview started to break down or not be applicable. Exactly. So I think that led to relativity and special relativity. And I would say they still belong to the realm of multiplicity, because you're still at the realm of parts.
KAI 8:10
The race between those parts, isn't
NISH
8:12
it? Exactly. Yes. Yeah. I mean, the great contribution is that the great difference rather, is that Einstein. Einstein added the fourth dimension of time, so obviously, yeah, yeah. So it was Newton was was thinking in terms of three dimensions, relativity theory now adds a dimension of time. But time is still linear time certainly is still within the realm of multiplicity, instead of having separate objects, you've got separate moments. But moments in time are still parts, in the same way that objects in space are still parts. So you're still still at the realm of multiplicity, relativity, and special relativity is just a more refined and advanced way of dealing with multiplicity, because you're taking into consideration time. I mean, Newton believed that time was just a constant. So he didn't really have to be a dimension. But in a sense, Einstein found that time was, in some sense, flexible. Okay. And that

that's what led to that relativity theory. But it's still multiplicity in that sense. Yeah. So you're dealing with macro events, you're not dealing with, you know, dealing with events happening at the level of the atom, or bigger. Where you're not dealing with the with what later on we'll see on micro events, which are subatomic events. And these macro events in space and time effectively happen relative to one another. So you've got these macro relativistic events. And if these laws of motion or Newton's laws, or even Einstein's laws effectively are correct, which they've pretty much been proven to be at the macro level. Then at that level, you've you've got what We can call an adequate determinism in that events at that level are pretty much determined. If we had enough information, we would know what's going to happen beforehand, at that level, and this is what Boehm referred to as the explicate order, which again is the order that is accessible to our senses. So this is the order of reality that we can pick up with our five senses and analyse using the powers of human reason that that's, that's effectively how Boehm would have defined the explicate order. So all of that comes nicely in this general category of multiplicity. Brilliant,

KAI
10:42
it's great to see how those things stack up really, as a concept, isn't it of multiplicity really, in itself? Like, it's really quite shocking. So which part would you explain next? After multiplicity?

NISH 11:03
Okay, um, logic, logically, I would I would normally explain the whole next. Okay. So here's what I would, what I want to say is that this relative world of multiplicity is not everything, there is a deeper realm, which is a more holistic realm where things are connected in a way they're not at the level of multiplicity. And in some sense, multiplicity is a manifestation or an emergence from out of that underlying hole.

KAI 11:36
Brilliant. Yeah. Brilliant. So this application of the whole and nonlinear time and quantum mechanics and part of the implicate order as bomb would explain it. Do do you think that that applies to your understandings of the whole as you've applied it to the other models? And the other cultures through the book? Well, unity?

NISH 12:12
I mean, I think he does reasonably well, yes, I mean, I think time at the level of multiplicity is putting it very crudely, the time it takes to get from one object to another, or the time it takes to get from one moment to another. And the best way

KAI 12:31 to
change isn't this.

NISH 12:33
Yes, exactly. Yeah, it's the rate of change at, at the data level of separate objects and of separate objects and separate events. And linear time is the best way that we've found, or the best way that has manifested

KAI
12:52
with our identities, obviously, and our personal and our personal systems, and obviously, societal systems, that's the best way we've found for our consciousness to move forward is linear time, isn't it? So in comparison, exactly, that's the

NISH 13:07
best way we found and
KAI 13:11 in comparison to that with the whole NON LINERA time then applies.

NISH 13:20
I think that there's two ways of looking at this. I mean, in a sense, when we are truly deep, deep in the hole, if you like, yeah, there's no time at all, because time actually emerges out of the hole in any form at all. But when we're using the word, the whole, I think we have to be a little bit generous with our use of that term. Okay. It's, it's kind of it would encompass if you like, the void. Yeah, out of which everything comes in back into which everything goes, Okay. What in, in Buddhism, we call that emptiness? Speaking, like, sort of, metaphorically, that's, that's the state that there was before the Big Bang, there was this kind of nothingness, out of which everything comes and back into which everything goes. But we can also use the word the whole to mean, if you like that, that initial singularity, out of whichever thing, you merge them back into everything goes. So that's not quite the whole. That's if you like that first. That first condensed point out of which everything emerges and back into goes, brilliant. There's this there's this distinction makes sense? The voice Yes.

KAI 14:50
Yeah, definitely. Yeah. So So

NISH 14:53
I would say if we're talking about the void, then it would probably be more accurate to say there's no time to talk at that level, okay. But if we're talking about the singularity, then I think time has to be clearly implicit in that. Because time is going to is something has to be there in that singularity out of which time can emerge. So that basic ground ground of time has to be. And I think at that level, because we don't yet have separate things and separate events,

KAI 15:28
IT WOULD be nonlinear time, it would be it

NISH 15:31
would be nonlinear time because linearity, we don't have the the network, the background network necessary on which to impose linearity. That has to be just that underlying potential for linear time, which, which we have to just call in very general terms at this point nonlinear.

KAI 15:52
Okay, so for these micro events under this nonlinear time, and this part of the hall, do you agree with me with the application of micro events and quantum mechanics at this level? Because as far as I see, if we're talking about the Big Bang, also, we're going to, we're talking about the Standard Model. And we're talking about atoms, both songs, particle physics, this is high. Intellect physics is particle physics is obviously nothing that I can express mathematically myself, but can grasp this idea. And I do think that this applies, you know, so would you agree with that application that of the micro events for human experience being within the realm of quantum mechanics? And at the heart of the whole?

NISH 16:47

Yeah, I think we can we can talk in those terms. Yeah. I think, again, if we divide the whole into void and singularity, just just to be really precise about this. I think, again, at the level of the void, there's no, there are no particles, there's no, there's nothing at that level. But as soon as you're moving into, as soon as you've, you've got the singularity in I mean, I'll just as an aside, I'll just say that Wilber Ken Wilber refers to these realms as he refers to the realm of the whole of the causal the causal realm, because it's the ultimate cause of everything that he distinguishes between what he calls the high causal and the local. So the high cause that is what I'm calling the void. That's emptiness, that's there's nothing there. And he refers to the low calls where he uses the term locals or to refer to that initial singularity, that initial point in eastern philosophy that's called the binder. It's that initial point out of which everything comes. I think, at that level, then yes, we, we have to start talking in terms of if we're going to talk about it at all, then yes, I think micro events and quantum mechanics is going to be the closest that we can get to that singularity. Because the micro events and the subatomic particles are going to be the initial, the very first thing that emerges out of yes, yeah,
KAI 18:11 it's the base the foundation, isn't it? It's the building blocks of form. Everything that comes out of multiplicity as exactly as interface has a factor of existence, basically, isn't it? For us as observers, then? So? Exactly.

NISH 18:30
So in that sense, the the micro events and the subatomic particles that are being described using quantum mechanics, are the most fundamental level of existence. And so they're, they're either there or they're at, we can either say that they're at the hole, or they are the very first miniscule manifestation that arises out of the hole. Okay, depending on whether we're talking about void or singularity. So, generally speaking, yes, we can definitely put that in that general whole realm in the in the more general way we're using that term? I think so. Yes. And there'll be an additional argument for this, when we come to look at the mechanics between the observer and the observed. But for now, before we come to that, we can just say that's the most fundamental realm at which the universe operates.

KAI 19:28
So would you agree that at this level BOMs explanation for implicant or delta play, I know you have a better understanding of bombs? Theories with this? So? Yeah. No order on coherence on the level of the whole does that? Does that stand up with the idea of what we've already explained of nonlinear time?

NISH 20:00
Yes, I think so, if we talk about the implicit order, again, as being that hidden dimension out of which everything emerges, and back into which everything goes, then quantum mechanics, because you're dealing with the most basic subatomic particles, is going to be the best language that we currently have to get as close to that implicate order as we possibly can. In the realm of physics. And coherence, yes, in the sense that the whole of the manifest universe exists in its potential state, at the level of the whole. And if if a universe that operates according to mathematical laws is going to emerge at all, then we must have that initial condition of coherence for that to even happen.

KAI 20:54
Okay, good. Understand that now, completely, I knew it was it adds some relevance. And I put in there with coherence. But thank you for

explaining that that was very insightful. So now we understand the ideas of multiplicity, and the ideas of how we've applied the whole. And we know that multiplicity comes from the whole full this process of emergence. We have to talk now about this interface between what is the observer, and the implications of the observer and what is observed. And obviously, then what I've applied as the interface between that relationship, or the interface and relationship between observer and observed.

NISH 21:49
So yeah. Yeah, so So my, when I originally formulated this model, my, my thesis was that, my question was, how does the Whole become the part? How does wholeness manifest as multiplicity? Is there an intermediate level between the whole and the part? And I was inspired really by the Eastern traditions at this point, because the Eastern traditions talk about the whole as being what they call the causal level, and multiplicity as being the gross level, but there's an intermediate level that they refer to as the subtle level. And that subtle level is the interface. I'm looking vertically now it's the vertical interface between the whole and multiplicity. Okay, yeah. And according to the Eastern traditions, it's at that subtle level, that an archetypal sense of self that sees itself as separate from an archetypal sense of not self or object starts to emerge. Or, to put it another way, we start to get the differentiation in a very subtle, implicit form, between mind and matter. At this subtle at this subtle level, also, I was inspired by the poetry you get in the Chinese tradition of Taoism, which, which I mentioned in my talk at Skipton, which, which which talks about how the one becomes the two and the two becomes the three and three becomes the many. So if if the multiplicity of the realm of multiplicity is, you know, either the three or the many, there has to be this intermediate place where there's a two in between the one and the many. And that to which they call the yin and the yang, I think in a more general sense has to be that that very first multiplicity that we make, in our in our day to day life, or the very first multiplicity that occurs in consciousness, the first division, the primary dualism, is that between the observer and the observed. If we didn't make that distinction, then talking about multiplicity wouldn't make any sense because there'd be nobody there to observe the multiplicity, you have to separate out itself first, before you can even talk in terms of separate parts, because there has to be somebody who's observing the separate parts. So that's why the whole I'm suggesting we have this initial differentiation between the observer and the observed. And then that differentiation, if you like, trying to think of the right word extrapolates to generate this world of multiplicity. So if we look at those in turn, the observer I think that's all quite straightforward. That's the sense of self. That's the subject. That's the mind. Yep. And the observed that the, the object, that's the the world of matter, that's something that we can be aware of. Yes. And you're including in there, can you explain a little bit about what you mean by sense of awareness and visual memory.

KAI 25:24
In terms of relative consciousness, relative consciousness is a visual model of consciousness. As attention to memory, okay, it's a higher order theory of consciousness as attention to memory. So, but it's a visual model. So part of the mechanics, and part of the understanding is that data points exist based on your sensory awareness. The points in your own personal timeline for whatever space you travel through as an observer, they are based on your sense of awareness. And what we're focused on mostly with the sense of awareness is visual memory. And visual memory is based on what you see in the environment. And it's visible because of

your exposure to the photons in the environment. And it's because of those photons that reality is able to manifest. And I think that applies to matter more than it would I think it applies to matter and object because it that's it in the environment around us is in a sense of visual memories. It's it's obviously circumstantial, to the observers net, wherever you are, there's so many variables for what you could observe, and there's so many variables for who could observe it. As we said, without the observer and the observed, we don't even get a multiplicity. So I think the sense of visual memory and sense of awareness applies to the observed that rather than observer because it's, yep, exterior of the observer.

NISH 27:34
Yeah, that makes sense. So we really are using the word observer in a very rigorous sense, just to mean consciousness, anything that anything that can arise as an object within consciousness, even if it's necessary for awareness to happen. If it's an object in consciousness, it's part of the observed not part of the observer. That's right. Yes, yeah. Okay, yep, that makes sense to me. Yep.

FULL INTERVIEW :

Quantum Mechanics and Relativity Theory (With Nishad Dubashia)
https://www.youtube.com/watch?v=5TtWh8yQROg

Transcribed by https://otter.ai

Interview 2 with Nishad Cote – Discussing our diamond model of relative consciousness and the application of Endoquantum Mechanics.

KAI 4:07
Hi.

NISH 4:10
Hi there

NISH 4:16
can you hear
me?

KAI 4:19
I can hear you now. Yes. Great and we're recording as well. So sorted

NISH 4:25
Yes. Awesome. So nice to meet you again. Nish fans we want to be the time you're very welcome

KAI 4:37
thank you.

NISH 4:39
So after

KAI 4:42
my connection is still stable so I'm going to wait if we wait two minutes just just going to buffer.

NISH 4:58
Okay. Does it normally improve in a few minutes?

KAI 5:00
Yes, it does. Yay. Yeah, kind of as a little bit of a delay, but once the connection is established, it seems to get stronger and stronger as it goes. So, okay.

NISH 5:19
Okay, so we seem to be connected pretty well, now, I can carry on with the meeting.

NISH 5:33
So I received your questions a few days ago. So if you wanted to give a brief intro, and then we can start going through the questions that you sent me.
KAI 5:47
Brilliant. Okay, so we've been working on the diamond model, the ground consciousness since the conference, we've been developing that. And it's taken quite a significant place in my research outcomes. It's been very interesting to have the dialogue with you about the diamond model. And your insights have been incredibly valuable. And I feel that a continuing dialogue about certain aspects of the diamond model is needed. But I also would like to, in line with the questions I've sent you, I'd like to pick your brains about certain aspects of the work that I've done. And certain aspects of the work that and apply into the diamond model, just to see what your insights are, and to see what your ideas are about these certain elements that are an ident as part of this logical system of cosmology. So your insights are extremely valuable to me initially. So we're going I'm going to be making the transcript of these interviews, and they'll be put into my dissertation, I'll be referencing your answers sothat you are a guide at this part of my life, and I feel that any insights you can offer me any understandings that you can add to this dialogue, extremely valuable, not just to me personally, but academically as well. So I just want to thank you, again, I'm immensely grateful to be eternally grateful for these times that you've all you're very, you're very well coming on.
NISH 7:20
Yeah, very happy to help in any way that I can.

KAI 7:31
Brilliant, brilliant. So should we start with the first question initial now let's, let's do that. So what I do is I read the questions as I've sent them to you, again, you can have a chance then to give your answers. Yep, I'll give my answer and then we can discuss it in more detail. And then when we feel we've done that

justice, then we can move on to the next. Excellent, brilliant, yes, brilliant. So, question one. In regards to the diamond model of relative consciousness, there is an element which I added drawn directly from my research outcomes called endo quantum mechanics, endo simply be in a combining form in and within. So from my research, it has become evident to me that they are quantum systems operating within our biological systems. So would you firstly agree with endo quantum mechanics been an appropriate definition for such systems?

NISH 8:28
Is that do you want to finish Question one, because there was a bit more than that? Or is that all have questions? Now? That was the question that was okay. So, yep. I mean, I agree that quantum processes are part of any living organism, they must be because of the very hierarchical nature of objective reality. So atoms become molecules, molecules become cells, cells become proteins, and so on, and so on. And if you're going the other direction, beneath atoms, if you like, we have subatomic particles, which are essentially the domain net quantum mechanics. So what I'd like to do is I'd like to share a screen with you actually. Because I think the four quadrants of Ken Wilber is integral theory is actually key to understanding some of the things we're talking about here. And it will help to give a framework to answer some of these questions. So would that be okay?

KAI 9:37
Yes, absolutely. Yeah, no problems. All right. So

NISH 9:43 tell me if
you can see this.

KAI 9:46
Yes, I can see that. Yeah. Okay.

NISH 9:54
Excellent. So I'll give you a quick like, overview of what this is. So if you remember, in the diamond model last time, we found that If you split up the diamond into these four quadrants, we have these four different aspects of reality. And these are effectively the four aspects of reality depicted here on this diagram. So, can you see my cursor moving around?

KAI 10:16
I can't Indeed, yes. Yeah. Okay. So this upper left, that's the that's basically the the mind. Think of that as the mind.

NISH 10:24
The upper right is the body. Okay, the bottom left is culture. Okay, autumn, right is society.So these are the four aspects of reality, which we derived from the London many the subject and the object last time if you recall that. Okay, yeah. Now, so Ah,

KAI 10:50

sorry, would this according to the diamond model, the way that we've drawn up the diamond model? Would these quad? Upper left? Does that pertain to? Subject? Upper right, does that pertain to object?

NISH 11:06
Yes, lower right. Yeah. Okay. Brilliant. Yeah. Visually, it applies directly to the model in directly to the diamond model. Yes, yes. So the, the upper left here would be the subject at the level of the whole, so that is the one individual subject, the upper right would be the one the the one individual subject is the mind. And over here, the one individual object would be the body. And down here, you've got the collective now, so the collective or multiplicity of subjects is culture. And over here, the multiplicity of objects is society.
Okay, so that's how we derive the four quadrants. And within each of these four quadrants, you can see these numbers going up from one to 13. And next to each number, there's there's a description of something. Now, these numbers represent evolution within that quadrant.
Okay. So if we start very quickly, at upper left, so this is the mind. So you can see here the evolution of the mind, as we as the mind evolves, we go through prehension, irritability, sensation, perception, then later on emotion concepts, Vision logic, these are the levels one to 13, of how the mind evolves. And we see exactly the same thing in the other three quadrants. So in the upper right, we see how the body or the physical world if you like, evolves, you've got atoms to molecules. And I'll just skip a few do it quickly. So you've got your organisms, Neural Code, brainstem, neocortex, and so on. So this is the evolution of the body in the brain.Down here, you have the evolution of culture. Now, the evolution of culture is basically the spiral dynamics levels that we talked about with all these different colours. So these are the different views and capacities that you can have in culture. So you can start off with physical vegetative locomotive. And then you start moving on to worldviews like Tai phonic, archaic, magic, mythic rational, you don't need to worry about the details of what they all mean, at the moment, we're just get the general picture. And then the bottom right over here, this is the evolution of society. So these are the stages that society goes through as it evolves. So right at the beginning, you've just got galaxies, then galaxies contract into planets, then you have living systems, then you start having human beings with So you started ecosystems, then you start having societies, groups and families, tribes, villages, empires, nations. So this is the way we get the evolution of society. Yep, yeah. So we've got these four different types of evolution going on in these four different quadrants simultaneously.And they happen together. So for example, as you get an evolution of the mind to level one, at the same time, you're going to get the evolution of the body to level one, the evolution of society to level one, the evolution of culture to level one. So these four types of evolution evolve together.

KAI
Okay, so no proportional evolution? Nice.

NISH
Yeah, exactly. So you've got these four types of evolution, which correlate with each other. Exactly. Yeah. So so just to give you an example, just to make this really clear, hopefully, let's say that, that the time that let's look at level six, so let's look at level five, the evolution of the mind. At level five is when we're able to start having sensation.That is the same time that the body develops the neuronal the body is a new Rhona organism, because you need a new organism to have sensation over here. Yep. Can be tense. Yeah. At the same time in the locomotive would apply then. Exactly sense. Yeah, exactly. And that's the same time you're gonna use exactly. And you can do that with any of these levels. At any point that one of them evolves to a certain level, you'll see the same level happening in the other three quadrants. So we call this Tetra evolution. Yeah. So evolution takes place across all four, together at the same time, and you need you need for evolution to happen in a stable manner in any one quadrant. It has to be supported by the correlate evolution and the other three.

KAI 16:00
That makes perfect sense. Yep.

NISH 16:12
So so this, you can think of all this as being within the diamond. So within the diamond, you've got your four quadrants, and all these levels of evolution happening at the same time. Yeah. Now your endo quantum mechanics. Now, here, your level one is atoms. But actually, just think that, you know, just slightly below that. Imagine you've got a level zero, which is not on this diagram, but imagine the level zero, which would be the quantum level particles at level zero. Yep. Okay. And, simultaneously, obviously, you'd have some very basic, something happening in the mind consciousness even before prehension something happening in culture, even before the physical, and something happening in social before the galaxies, which would probably be like your quantum potential. Yeah, yeah. Okay. Yeah. Yeah. Now, your idea of endo quantum being always present whenever there is a living organism, or living consciousness would work here, because what you can see here is that the other thing I must mention is that as, as you evolve up these levels in any of these four quadrants, the higher levels contain the lower levels as subsets. So Molokhia, foundations, obviously, that the v's and the holons are built upon, isn't it? So exactly, we wouldn't be able to get to level seven without having gone through level five and level six. Exactly. So you can't have molecules without atoms, you can't have, you know, organisms without molecules. So you can have planets without galaxies, you can't have you know, magic without our cake, you kind of concepts without symbols, the lower, the lower is always a subset of the higher. So what you can see here, if you just look at the upper right quadrant is that the quantum particles at level naught always have to be there. If you're going to have say, a neural corridor or reptilian brain stem, at level seven, which is where your consciousness, your obvious consciousness is going to start. So that that matches what you say that you must have quantum processes wherever you have consciousness in the living being, because you've got to have level naught before you can have sort of level six or seven.

FULL INTERVIEW :

Nish Dubashia & Kai Wayne Holland – Human Evolution, Endoquantum Mechanics and Relative Consciousness.
https://www.youtube.com/watch?v=NCXPUlLDDXs

Transcribed by https://otter.ai