

RESEARCH METHODS & COMMUNICATION

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RESEARCHED AND DEVELOPED FOR SUBMISSION IN
THE RESEARCH METHODS & COMMUNICATION MODULE
ON THE MASTER BY RESEARCH PROGRAM
(MRes) ART & DESIGN.

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RESEARCH PROPOSAL – STUDYING & DEVELOPING SCIENTIFIC VISUAL MODELS.

BACKGROUND & CONTEXT – CHALLENGING GRAND NARRATIVES.



Fig 1 :The sketch is a first impression of the DNA double-helix

"A rough sketch by Francis Crick showing his first impression of the DNA molecule has been released on the web. The doodle, done on a scrap of A4 paper, provides the first hint of the famous double-helix structure of DNA. The Cambridge scientist, who died in July 2004 aged 88, identified the shape of DNA with Dr James Watson in 1953. The pencil drawing has been posted on the internet as part of a project to open the late scientist's life and work to the public. Crick famously celebrated by going to a local pub and telling regulars that he and Dr Watson had "found the secret of life". The breakthrough, which helped to earn the pair the Nobel Prize in Physiology or Medicine in 1962, heralded a new era of genetic science."

(BBC NEWS | Science/Nature | Crick's first DNA doodle released, 2020)

Many major advancements in knowledge and testing throughout modern and post-modern times have come from basic models of natural phenomena. Crick and Watson not only won a noble prize with their estimations in this simple model of the double helix and the surrounding notes. **(Anderson, 2020)**

This was revolutionary for our ideas of ancestral genetics and our understandings of our physiological makeup as animalistic human beings. Great advancements in knowledge have been made by a leap of faith away from a preordained perspective with a minuscule objective glance at something in nature and for lack of an appropriate anomaly, an appropriate lack of insight. **(Connor, 2010)**

These are all driving factors for researchers, experimenters, and practitioners in all kinds of fields. This is the process of imagining and discovering through the visual development of thought and ideas. I'm certain that this is at least one way of how new ideas become new knowledge. The double helix as a signifier evolved (excusing the lame science pun) into a world accepted symbol for genetics and genetic science. Both of these areas of scientific research and understanding are driven by our need to know more about ourselves and our ancestors and this is nothing other than the generation and progressive evolution of semiotic language through global historic and cultural change at its finest. **(Connor, 2010)**

Crick and Watson won a place in history, **forever.**



Fig 2: An example of a modern MRI scan of the human brain.

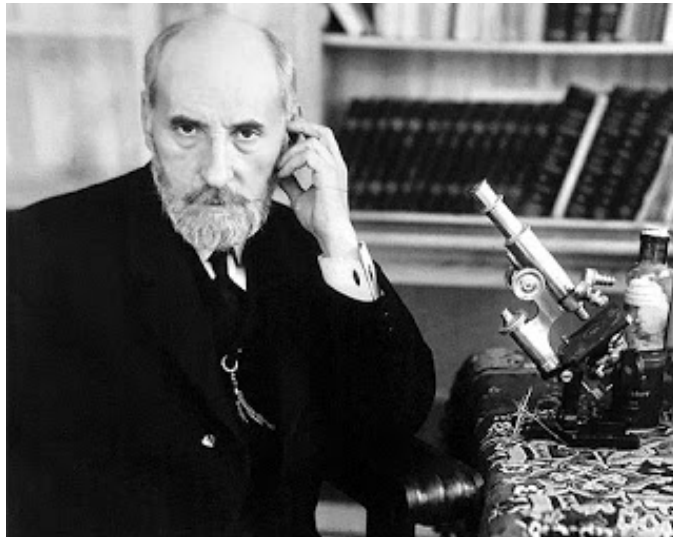


Fig 3 : Santiago Ramon Y Cajal sits with his microscope.

Santiago Ramon Y Cajal also won a place in history. He was one of the first anatomical researchers and arguably core artists to have anatomical drawings and models of brain anatomy and cells structures of the brain to be accepted as reliable models for educational purposes. These drawings, with historical insight and retrospective investigation, also proved to be resonant with modern MRI topologies. **(Our Beautiful Brains: How The Father Of Neuroscience Makes Synapses Look Like Modern Art, 2020)**

All of this world-changing, revolutionary and progressive and narrative challenging understanding comes from a source that is a simplified visual model or visual representation of natural phenomena.

How this research is relevant to what I plan for my work?

MAKING THE ABSTRACT TANGIBLE.

Throughout my reflections on research so far and through work with scientific models it is clear that the researcher is making or attempting to make abstract ideas tangible through modern design solutions. It is also clear that the researcher is proposing the presentation of a new idea, and a new proposition or interpretation if you like, for understanding the conscious experience of the observer in light of all available data and relevant discoveries of modern physics.

Modelling the unseeable.

After reflection upon a wide range of sources the research has highlighted that the nature of consciousness has been prescribed to us as a non-falsifiable, non-testable phenomenon. **(Ball, 2017)** I have personally heard scientists say that there is nothing there to see or measure. We are told that the nature of our minds within our existential perceptions and experience of subjective and objective reality is simply

the result of chemical and electrical impulses in our brains, like feedback from the greater inaccessible natural systems that we are born in to with our bodies. **(Ball, 2017)**

The grand narrative here is told to us cold and simply in one statement. "When we die, there is nothing after." Our lives don't matter. everything about us in the cosmos is so infinitesimally small that nothing we do, feel, or experience really matters. nothing has any significance. **(Ball, 2017)**

What this research intends to explore is the opportunity to challenge that narrative that we cannot visually model consciousness through modern scientific and mathematical design principles. The research will not be looking past death. The research will look past the base understanding that there is nothing there to quantify about our time while we are alive, firstly and then the researcher can try to achieve a visual model or instructional/educational aid that helps the researcher quantify the conscious experience of the observer from birth to death with inclusion and appreciation for the value and all of the cosmic workings of everything in between. **(Descartes, 1647) (Fernandez, 2018)**

AIMS & OBJECTIVES

Main Plans: To research modern modelling techniques applications and standards.

To research the place of the designer within science. To research designers and scientists who use design as core focus for their works. Focusing on educational and informative value of these kinds of topics the research will explore the kinetics for visualising ideas with visual design solutions for creating aids and tools in communicating ideas visually. After research, the researcher will then engage in a large body of practice. Including but not limited to the researcher's plans to create a mediated and well developed visual model for the conscious experience of the observer based on an appropriate theoretical framework of current and commonly accepted theoretical physics principles.

Then, to further explore with scientific visual models and the use of certain media and mediums (Glass etc,) to create artistic visual experiences and vessels for communicating knowledge through visual imagery or visual models in art and design.

In science and science education, visual models are used as tools and aids to convey ideas and concepts. Sometimes this is after a long period of research or data harvesting and sometimes it can be about indexing and cataloguing species. But, primarily in the beginning models can be about predicting ideas, imagining phenomena, and making estimations and approximations of how these abstract phenomena might manifest in a visual context that conveys all of the underlying principles. They can be used to limit and simplify a concept, theory, or object. Sometimes they will be used in a situation where experimentation is not feasible to

further test the hypothesis. Often inaccurate from the plethora of developing professionals and laymen, these models can be a simple drawing, a diagram, or a flowchart of events or sequences of mechanical operations of observed or imagined phenomena. Some may be inventions of technology or products or even a design for a transport system. New knowledge comes by changing the old and challenging narratives. In these senses, anybody who can draw and process an idea or concept visually could possibly build and develop a model. The question is then posed, how do we find a valid and reliable model that changes or even reinforces how we communicate this knowledge and these principles and laws of our existence in an inspiring and informative way to our growing academic and impressionable populations? **(Scientific modelling, 2020)**

What makes a good model?

According to this website educational progress can be made by making sure of all of these principles when developing visual models. Models must be 'based on reliable observations.' 'able to explain characteristics of the observations used to formulate it' 'predictive' etc. **(Carolina.com)** All of these factors will collectively help to make a visual model more effective in its communication but en masse and through historic and retrospective reflection this idea of accuracy hasn't always been a necessity for advancing knowledge and inspiring cultural change.

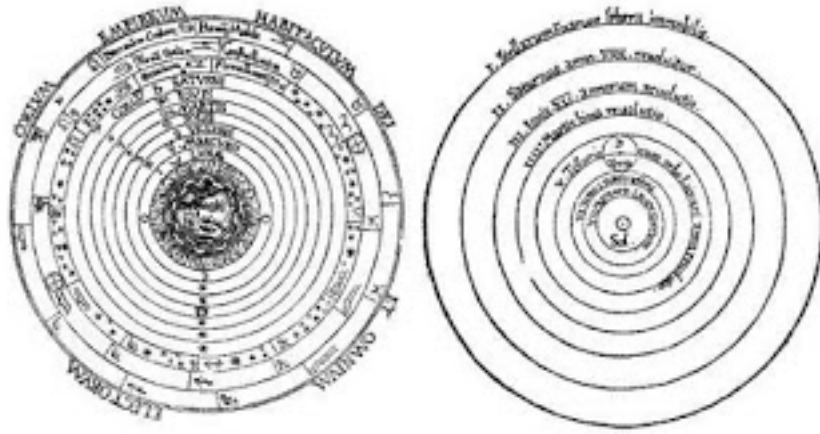


Fig 5: Copernicus and Galileo's historic and brilliantly basic heliocentric model of the universe.

When the likes of **Copernicus and Galileo** were proposing their heliocentric models of the solar system I can imagine them being faced with some resistance and this is historically true. A lot of Galileo's work is rumoured to be still locked in secret vaults at The Vatican and this, if true, has also had historical and cultural implications for us to consider when we are bringing combative and contentious debate with what we are trying to communicate with new and world-changing ideas or concepts. **(Kelly, 2016)**

This idea of everything revolving around the sun was new and challenging to a lot of people and even empires that came before him had pondered with these topics and cultural concerns of disseminating this information to the masses. **(Mayer, 2009)**

This model was actually proven to be somewhat inaccurate in modern times. Some pedantic types and theoretical buffs claim inaccuracy of scientific concepts in models like this for several reasons. For instance, this model does not show the elliptical

eccentricity within the orbits of the planets which developed as new understandings. Further, this model is not to scale and does by no means give us any idea as to the proportional size of the phenomena of the solar system in comparison to us or relative to the greater universe. *(The importance of scale will be covered further on)*

Regardless of the 'inaccuracy', these models were proven to be educational and reliable in many senses. Even now it is promoting the scorn of the pedantic theoreticians which is still a sign of inspiring thought and provoking intellectual debate. **(Evagorou, Erduran, and Mäntylä, 2015)**

These examples pose a key and critical question to me - **does a good scientific visual model really depend on always being completely accurate?** In truth, so far, **the research says no**. It's logical to agree with the prerequisites about accurate observations and documentation from experiments. So too that they should be predictive but the research does demand that models be 100% accurate.

This would be to neglect innumerable avenues of thought and development of theses from so many great minds not to mention having to sustain an ignorance of the importance and the roles of mathematical modeling for economics and business, worldwide, for instance. This proclamation of "needing accuracy at every finer detail" to convey an idea or concept appropriately would be to ignore the importance of imagination and deny the significance of our most innocent human errors, as a statement, it is a bridge beyond the bend of the steel.

"IS THAT TO SCALE?" - Every armchair scientist on Facebook.

Another fine example of a contentious point in visually modeling phenomena, ideas, and concepts is the use of scale and the importance of scale in communicating ideas in the cosmos in visual models. This actually gives me a chance to share with you an interesting truth about the use of scale and what it would actually be like if we were to model say the solar system to scale.



Fig 7: A simple image of the planets in our solar system.

from NASA.COM

"In an effort to bring these vast distances down to Earth, we've shrunk the solar system down to the size of a football field. On this scale, the Sun, by far the largest thing in our solar system, is only a ball about two-thirds of an inch (17 millimeters) in diameter sitting on the goal line — that's about the width of a U.S. dime coin. Considering a typical honeybee is about half an inch long, the fans are going to need telescopes to see the action. The inner planets — Mercury, Venus, Earth, and Mars — are about the size of grains of sand on a football field scale. They would be dwarfed by a typical flea, which is about 3 millimeters long. Closest to the goal line is Mercury, just under a yard from the end zone (.8 yards to be specific). In reality, the average distance from the Sun to Mercury is roughly 35 million miles (58 million kilometers) or 0.4 AU. At this scale, Mercury's diameter would be scarcely as large as the point of a needle. Venus is next. It is 1.4 yards from the end zone. The true average distance from the Sun to Venus is about 67 million miles (108 million kilometers) or 0.7 AU. Its size on this scale is about 0.15 millimeters. On to Earth, sitting pretty on the 2-yard line. It is slightly larger than Venus at about 0.16 millimeters."

[\(https://solarsystem.nasa.gov/news/1164/how-big-is-the-solar-system/\)](https://solarsystem.nasa.gov/news/1164/how-big-is-the-solar-system/)

Ridiculous expectations...

Knowing and understanding these facts about the sheer scale of the solar system and in the reflection of what this may mean for the size of it relative to us and the universe is to understand that to replicate it in a visual model to scale of one example from space.com would need a canvas which is a minimum of six kilometres wide, to use NASA's example with a canvas the reference frame size of a football field this would then mean that the planets would present as minuscule dots in comparison to any of our anatomies and our immediate environment and surroundings as observers.

Asking for a visual model of the universe to scale is not out of reach though and has been done digitally by numerous practitioners but don't expect to actually see any of these celestial marvels that map our beautiful cosmic terrain in any kind of detail while witnessing the performance of this task.

However, this is not to say that it would be wise to completely eradicate visual models of a sense of scale.

Scaling is imperative to the seamless functionality of all kinds of art and design practice especially modelling in science, design, and architecture. Scaling can be a fundamental tool in planning and achieving massive cultural goals through civil engineering and the eco-socio-evolution and development of our environments going forward.

To some, the scale is everything, and from research it is difficult to take an extreme stance against the Facebook armchair science gurus. The research shows that the idea of scale is important but to some visual models, we have to look past this sometimes-pedantic prerequisite and simply enjoy what is actually applicable to the things that people create to convey their ideas.

People need to be human and I feel we need to keep the human element regardless of human error. In fact, in the context of advancing knowledge with imaginative and creative visual models of ideas and concepts and in light of this idea of complete accuracy being fundamental – the research suggests it is our errors that light the way for any potential progress towards visualizing the truth. **(Evagorou, Erduran and Mäntylä, 2015)**

PROPOSED METHODOLOGY

The researcher plans to look at the works of a handful of Graphic Designers and qualified physicists and scientists who have reached into the worlds of art and design to communicate their thesis or research. This will help to explore and evaluate the realms of science and design as interdisciplinary practice and the role of the designer within science.

Further, throughout the research and developing plans, for a visual model of the conscious experience of the observer the researcher is engaged in studying the concepts and principles of relativity, quantum mechanics, classical mechanics, and quantum field theory. After research considerations are primarily being made through physics but with explorations into other models the research highlighted a path to keep encompassing biology, chemistry, biochemistry, genetics, epigenetics, neurology, and astronomy as these are also vital to the visual research and developing knowledge base. The research is also aimed toward investigating at the psychology and nature of memory - more notably trauma and contemplating these principles as the research develops and trying to apply them visually in relation to the mechanics of the conscious experience of the observer and the processes of making and storing retrievable memories through the systems at play in all of our cohesive perceptions of reality.

These topics actually come into play with all of the other proposed projects; The researcher is engaged in work on a scientific visual model/ hypothesis for the nature of gravity and its relationship to mass, the Higgs boson, and the greater universal

Higgs field. Again this is challenging a grand narrative in science, one which says that we cannot achieve a completely accurate visual model for the nature of gravity. This links back to the interesting theoretical question at the earlier stages. Does a visual model have to be completely accurate?

The researcher is also engaged in studying the nature of light and its relationship to memory and establishing a design path to communicate that concept through a creative glass piece. The researcher has never used glass before but it will be productive and progressive and expansive to the researchers practice to engage with this medium for a hands on creative aspect of visually modelling the nature of light through creative glass.

Central to theoretical developments for a model of the conscious experience of the observer is the nature of light and how we perceive light through the electromagnetic radiation in the environment – so these project are intrinsically linked theoretically. Glass is a light carrier; it is a vessel of transportation for the travelling photons of our vision and so use of this medium to convey the nature of the wave/particle photon would be the use of the material as a symbol for communicating the knowledge it holds. It will be an autological artefact, something that speaks itself visually.

This avenue of focus on scientific models is an exciting pathway for study and explorative practice professionally as an artist. Even if the researchers personal models proved to be logically redundant, the research is appropriate and well referenced in creating the hypothesis which shows learning and expansive practice into unknown areas to establish new areas of knowledge. Th researcher's plans for

the glass piece to communicate the nature of light will also look impressive and be evocative and thought-provoking as an experience of an autological visual artefact to look at and ponder.

The gravity model as a vast body of visual and theoretical exploration boasts a world of opportunity for explorative practice through visual mediums but not only practice with various media. There are opportunities for exploration through digital and computational art generation and there are all kinds of modern tech developments that could be utilized to showcase the proposed eventual works from this avenue of research. **(Models in Science (Stanford Encyclopedia of Philosophy), 2006)**

While working through these topics the research has demanded further research towards all kinds of tributary topics. So far, there is a documented research journey through researching and applying understandings in psychology, philosophy, and the scientific method, namely Descartes and also cartesian doubt – all of which will be employed in developing the practical visual work especially the scientific method or the cartesian method. **(Descartes, 1637)**

The researcher has a growing understanding of certain aspects of epistemology namely logic and reason and aims to also continue with these reaches through philosophy, psychology, and the nature of knowledge, as they are mutative in contemporary science modelling and as they are also tributary in themselves to his own conscious experience, personal identity, and also his greater journey as an observer on his quest for knowledge through this barbaric landscape in this space

and time. (Henrickson and McKelvey, 2002)

The researcher will then reach out academically into the world of professional and academic sciences which relate to these areas of study in hope of finding mediation from someone appropriate for evaluating the hypotheses within these fields of scientific exploration. This will be achieved through guidance and support from the researchers learning coordinators in so that any information, reflections or advice from these academic and educational authorities might be gathered in the most ethical ways for validating the research and the visual reflections.

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ETHICAL CONSIDERATIONS

After reflecting on research it is clear that there are a number of ethical considerations to be made surrounding this kind of research and the new knowledge the visual work may lead to.

The sensitive nature of consciousness as a debate topic is understandable. There are numerous religions who preach higher conscious abilities divinely gifted to us by our creators. There are people who live their lives by philosophies of conscious practice of thought and mind. There are instances where these practices and concepts and cultures and ways of living have been passed down for centuries.

It is further understandable where practitioners of these kinds of thought processes and religious practice might feel that a simplification of the conscious experience of the observer would be to reduce so many variables to an idea that would lose the entirety of the subjective value of their perceptions of consciousness and what it means to be conscious in this universe.

In defence of the work the researcher feels he has been on a spiritual journey of his own in relation to the discoveries already made along this process of enquiry for informing practical visual creative practice. He has personally learned to adopt a philosophy of god even if there are no earthly religions that resonate with what he feels is there in the universe. Further more, the researcher would like to make it clear that Descartes's 'Meditations in first philosophy' was originally named "Meditations in first philosophy with acceptance for the existence of god and the presence of soul." –

The researcher would use this point to emphasize that there is a deeply spiritual connection between him as an artist and designer and the work he is conveying visually as a reflection of extensive research.

For conveying these personal connections to the work the researcher feels the work will not result in diminishing anyone's conscious experience. The researcher hopes for anyone who sees or interprets the work to understand the complexities of all of the cosmic systems at play in what is our shared objective and individual subjective reality.

The truth of what the research will show is the core of every religious message passed down through the ages. It is what makes us all the same in the eyes of existence regardless of what we or anyone else thinks about the quality of our minds our thoughts or potentials. The research shows that we are equal in this garden as humans reaching into the cosmos as products of the cosmos, together.

Furthermore, considerations will be made into the ethical implications of approaching a development in knowledge through this kind of science from an art and design background and developing professional perspective.

Reflecting on research this is a non-issue as any argument against the proposed approach is easily counterbalanced as it is clear that the evolution of design and design practice has always had a hand in hand completely functional and co-dependent relationship with developing science and resultant technologies mainly

physics. This is historically true and possibly fundamental going forward.

Regardless of whether the researcher possesses a physics PhD, the work will show scientific mediation and a complex and developing understanding for making considerations of a vast array of reading materials including but not limited to the use of cartesian first philosophy. The work will be developed in reflection to these meditations and through cartesian method. The researcher is centred as an explorer of key critical thinking skills associated to this avenue of professional practice and he has a passion and a unique ability for communicating scientific knowledge or ideas through using visual design solutions.

Einstein made many references to the need for imagination and creativity. Someone like the researcher with the required creative skill sets, developed technical insight and working with this kind of research on this explorative pathway for developing visual theory and practice through science and art might be overdue?

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