

# Within you, without you – a sculptural exploration into the concept of reality using the philosophy of quantum physics.

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*'We all start from naïve realism, i.e., the doctrine that things are what they seem. We think that grass is green, that stones are hard, and that snow is cold. But physics assures us that the greenness of grass, the hardness of stones, and the coldness of snow are not the greenness, hardness, and coldness that we know in our own experience, but something very different. The observer, when he seems to himself to be observing a stone, is really, if physics is to be believed, observing the effects of the stone upon himself.'*

*Albert Einstein*<sup>1</sup>

## 1.0 Abstract

This document establishes a contextual relationship between artists working in sculpture who use inspiration gained from the science of quantum physics and consciousness studies, and the current series of sculptural research in which I am engaged. The artist has the unique ability to express their version of reality through art for others to share by interpreting and discussing scientific concepts in their artistic practice. The methodology by which I will achieve my objective will be discussed as well as a brief overview of the artefacts which have already been produced.

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<sup>1</sup> On Truth & Reality, The Spherical Standing Wave Structure of Matter (WSM) in SpaceMetaphysics & Physical Reality  
<http://www.spaceandmotion.com/metaphysics.htm>

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## 2.0 Introduction

*Art does not deal with unknowns. Art strives to create an image of that which was unknown, making it thus known.*

*Nuam Gabo*<sup>2</sup>

Science and art are both modes of cognition by which man receives information about the world.<sup>3</sup> The use of science as a reference point for the creation of artistic work is not a new phenomena, during the Renaissance period artists such as Giotto di Bondone<sup>4</sup> and Leonardo da Vinci were noted for their use of scientific constructs to inform their art. The early 1920's brought about a creative explosion both in science and art. Discoveries in physics by Albert Einstein and his contemporaries incited a corresponding torrent of activity in the arts with the work of artists such as Wassily Kandinsky, Marcel Duchamp and Alberto Giacometti<sup>5</sup>

In his work, *Art and physics, parallel visions in space, time and light*, author Leonard Schlain proposes that the disciplines of art and science run along a complementary track, stating that “revolutionary art and visionary physics are both investigations into the nature of reality”.<sup>6</sup> Using the science of quantum physics from a philosophical point of view, my exegesis will be an attempt to examine the concept of reality from the viewpoint that the world we consciously perceive is an illusion, created by the complex mechanical workings of our brain, as influenced by the theories of quantum physics. The project will be expressed in the nature of an artistic interpretation, forming a non-literal translation of the research material. I intend to bring an intuitive response to the interpretation of the philosophical concerns of quantum physics and the question of reality.

## 2.1 Overview of exegesis

In this exegesis I will be discussing my research project in a contextual relationship with contemporary sculptors whose work interacts with scientific concerns. In Chapter 3 a brief explanation of the methodology used in the physical construction of the artefacts is discussed, chapter 4 explains the history of my engagement with the subject of quantum physics and discovering the nature of reality. In chapter 5 the conceptual paradigm which underpins the research project is explored and in chapter 6 a contextual affiliation is established with artists who look to science as a conceptual paradigm.

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<sup>2</sup> *Statements and Documents: Artists on Art and Reality, on Their Work, and on Values*  
Vol. 89, No. 1, The Visual Arts Today (Winter, 1960), pp. 79-126  
Published by: The MIT Press on behalf of American Academy of Arts & Sciences

<sup>3</sup> Richmond, Sheldon, *The interaction between Art and Science*, Leonardo, Vol. 17, No. 2, pp. 81-86, 1984. Printed in Great Britain.

<sup>4</sup> Giotto not only created the device of perspective as we know it but also notion of a single moment in time captured within the frame of reference, based on Euclid's geometry.

<sup>5</sup> Schlain, Leonard, *Art and Physics, parallel visions in space, time and light*, Morrow, 1991, pg 204

<sup>6</sup> Schlain, Leonard, *Art and Physics, parallel visions in space, time and light*, Morrow, 1991, pg. 16

### 3.0 Methodology

The research will be conducted using participatory action research (PAR), a soft systems methodology.<sup>7</sup> This research method entails investigation into scientific sources to gain an understanding of the subject matter followed by a period of reflection in which the research material is absorbed and internally catalogued into the existing knowledge base. Usually a work will begin with a phrase or particular idea which has caught the imagination, often the title exists before the work emerges, the work then being constructed to reflect the essence of the title.

Although on commencement of a new work the piece has a formulated intention often this quickly becomes taken over by an intuitive creation process, letting the material and the idea take precedence in the working strategy. Once work has begun on the artefact a process of intensive working and periods of reflection to ascertain if the intent of the work is progressing according to a personal aesthetic ideal. Often the work is photographed to enable an objective viewpoint on which to make an assessment on which direction to take. Works are seen to be completed when there is a degree of satisfaction derived in the knowledge that the work has achieved a sense of the original intention.

### 4.0 Why quantum physics? - How my interest in this research begun.

I have been interested in consciousness studies and how we perceive reality for many years, but became really focused on the study when my father died several years ago. We often spoke of what might happen when this life is finished and my father, who was the more likely to find out soonest said he would let me know when the time came. On the day of the funeral a series of minor catastrophes occurred which I could only believe were the unrefined attempts at communication that had been promised. My mobile phone and television both electrically shorted out irreparably, and during the wake our mains water pipe exploded causing me to discretely send off a relative to the plumbing supplies shop for repairs. Eventually I sent up an *I get it!* to stop the uncontrolled occurrences.

Perhaps this is what I wanted to believe but nevertheless, this event became the catalyst which led me to begin a search to understand how we perceive and create the reality around us. I decided to use a scientific approach to qualify theories I may have already postulated and so, began my search into the field of quantum physics and the resulting question of consciousness.

### 5.0 What is the conceptual paradigm?

The information about the esoteric nature of the way our world is constructed filtered its way into my sculptural practice, art having the ability to express ideas in ways that scientific theories cannot. The work is intended to be an intuitive attempt to convey a deeper sense of reality and has naturally divided itself into two quite different but complimentary areas. The figurative sculpture is strongly influenced by the theories of quantum physics, particularly non-locality and the observer effect. I have used this investigation and related studies into cognition, as the theoretical construct on which to base a conceptual paradigm, expressing ideas through the use of transparency and the use of physical layers to build the illusion of materiality.

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<sup>7</sup> Kemmis, S. and R. McTaggart (2005). *Participatory action research. The Sage Handbook of qualitative research*, Eds N. J. Denzin and Y. S. Lincoln, Thousand Oaks, Sage Publications.

An understanding of two of the basic concepts of quantum physics, quantum entanglement or non-locality and the observer effect form a foundation of the sculptural research. Quantum physics deals with the smallest particles in the spectrum of matter, at the atomic level. One of its fundamental aspects states that everything, light, matter, the universe, is made up of either a wave or particle formation. The quanta (particles), remain in a state of suspension until the act of observation, upon which time they *collapse* and become a part of reality as we know it. This implies that the observer<sup>8</sup> becomes crucial in the measurement of the properties of a particle. The theory also postulates that particles exist in a state of superposition or potentiality until they are affected by the observer<sup>9</sup>. This means that a particle exists with the possibility of infinity different states until an observation defines the properties of the experiment, at which time the wave/particle function collapses into the expected outcome, and the particle manifests as reality. Therefore this implies that the particle does not exist as such, in this level of reality until it has interacted with the observer.

The other theory that is important in my work is quantum non-locality or entanglement. Studies into the theory of entanglement show that when two particles have come into contact with one another, they become intrinsically connected. In certain situations a measurement made on one particle, (known as an EPR measurement, for Einstein, Podolsky and Rosen), appears to affect instantly the properties of the other particle, no matter how far apart the two particles are<sup>10</sup>. The rotation or speed of the particle measured is also directly affected by the effect of an observer. This instant communication between particles seems to directly violate the laws of relativity as anything moving at faster than the speed of light is actually moving backward in time.<sup>11</sup>



Figure 1, Wedding-Marchioro, Lorry, *Untitled Head*, 2011.  
Glass reverse painted on multiple layers, cold laminated

The notion of entanglement changed the world of physics; matter could no longer be considered a separate entity. Particles that had been in contact with one another would continue to communicate their influence indefinitely; the world at its most basic exists as a complex web of interdependent relationships, forever indivisible<sup>12</sup>. It then follows that not only particles at the atomic level, but ultimately all objects in the universe<sup>13</sup> retain a deep underlying connection with one another through the laws of non-locality.

I use these theories in my sculptural work, particularly the theory of non-locality expressed by the shuddering and vibrational tendencies of the forms.

<sup>8</sup> *Observer* – The person, who is conducting the experiment, decides upon a result and affects the action of the particle in question.

<sup>9</sup> *Copenhagen Interpretation* – states that sub atomic particle exist in a state of potentiality and only become actualised upon observation.

<sup>10</sup> This phenomenon is known as *Bell's Inequality principle*.

<sup>11</sup> Schlain, Leonard, *Art and Physics, parallel visions in space, time and light*, , Morrow, 1991, pg. 131 (Schlain 1991)

<sup>12</sup> McTaggart, Lynne, *The Field, the quest for the secret force of the universe*, (HarperCollins Publishers, Great Britain, 2001) 11

<sup>13</sup> The laws of *non-locality* apply not only to the micro structures of experimentation at the atomic level, but to the macro structures, the Universe and the cosmos, whilst not in direct physical contact as they continue on their trajectory into space, speeding away from each other at a rate higher than the speed of light, in the initial moments of the big bang, during Planck time, (the first 10-35 second following the big bang), all parts of the universe were in contact with each other.

McTaggart, Lynne, *The Field, the quest for the secret force of the universe*, (HarperCollins Publishers, Great Britain, 2001)

## 5.1 Figurative work

The figurative work is made up of different levels, each cut slightly differently and placed in juxtaposition to create a sense of the tension of the particles vibrating in their sea of potentiality. The layers are painted with imagery which references the act of personal observation, an insight on the artist's conscious definition of reality. Often images are created by building up the image over several layers of transparency, thus involving the viewer in the act of observation, the image only being able to be viewed from a certain vantage point, disappearing when seen from a different angle. This work primarily uses glass as a medium due to the plastic possibilities of the material.

Reference is made in the sculptural glass work to the way the brain decodes received sensory information, using memory to create short cuts in which to create a version of reality edited to satisfy the demands of both survival (for which it is hard wired) and conscious awareness. As with the works, "Prince of Clouds" and "Untitled Head", images are painted onto successive layers and transposed on top of one another to allow for the reading of the image. This image is subject to distortion depending on the position of the observer. In "Untitled Head", the fuzzy, subjective phenomenon of memory is encountered in the imagery of two friends talking, with time memories become distorted and confused, thoughts and feelings collide with the image and become irretrievably juxtaposed, resulting in an embedded memory that may be as much fantasy as truth.



*Figure 2, Wedding-Marchioro, Lorry, 2011. Prince of Clouds.  
Glass reverse painted on multiple layers, cold laminated.*

## 5.2 Ripple series

The second area of sculptural practice I am concerned with takes a slightly different angle to express an understanding of reality, preferring a more meditative approach. The architectural sculptural series, Ripple, uses a more referential interpretation of the entanglement theory. Wall mounted, carved wooden components are arranged into spatial arrangements, referencing the way all things in the Universe and therefore humanity are intrinsically connected and yet remain separate. Ripple also refers to the genesis of an idea, as in a pool of water, the wave vibrating outwards in its concentric formation, being passed from one person to the next, slightly changing and growing with each retelling. The texture is reminiscent of the wave structure which is a fundamental construct of quantum physics, the basis for the formation of matter, which makes up our material world.



Figure 3, Wedding-Marchioro, Lorry, Ripple-meditation on a pixellated paradise, 2011

## 6.0 Artists who form a contextual framework

*Science is an abstraction of the role of rationality in art, and art is an abstraction of the role of imagination in science. Consequently, art and science form an interdependent system.*

*Sheldon Richmond*<sup>14</sup>

Artists act as a reflection of the human zeitgeist, as science becomes more intricately part of our lives, and the world as we know it continues to speed up, people have begun to look for explanations other than the traditional to explain the greater mysteries of life and their place in the world we live in. In this chapter I am establishing myself in a contextual paradigm of artists who are looking to science to explain or underpin their conceptual message.

<sup>14</sup> Richmond, Sheldon, *The interaction between Art and Science*, Leonardo, Vol. 17, No. 2, pp. 81-86, 1984. Printed in Great Britain.



Figure 4, Voss-Andrae., Julian, *Quantum Man*, viz.cwrl.utexas.edu

The artist Julian Voss-Andrae, previously a quantum physicist at the University of Vienna,<sup>15</sup> argues that art such as his sculptures can indicate aspects of reality that science cannot.<sup>16</sup> Voss-Andrae explores the world of quantum physics with his sculpture, *Quantum man*.<sup>17</sup> The idea of the form made up of a solid material being viewed as solid from one point and then when viewed from another becomes transparent, nearly invisible. Voss-Andrae states, “In the context of quantum physics–inspired art it is natural to see *Quantum Man* as a metaphor for the *wave-particle duality*, the phenomenon that all matter exhibits wave-like or particle-like properties depending on the experimental question we ask: *Quantum Man*’s particle-like concreteness when seen from the front shifts to wave-like near-invisibility when the sculpture is viewed from the side.”<sup>18</sup>

In a similar way to the work of Voss-Andrae, my figurative sculptural pieces are made up of numerous layers which depending on the angle of the observer can be read as one or many. As I am working with glass, this technical device enables the use of multi layered imagery which deepens the textural quality of the work.

Increasingly artists are looking to the quantum physics as a conceptual construct. Sculpture in particular has great ability to capture a sense of the swirling formless energy on its point of collapse into solid form. Antony Gormley has explored these possibilities with his series *Domain* and *Feeling material*. Figurative sculptures which embody the essence of the swirling wavelike energy field on the point of becoming human. Similarly, Tony Cragg uses quantum concepts with his wonderful work, *Bent of mind*. This work depicts the plastic nature of reality impacting on the human psyche.



Figure 5 Gormley, Antony, *Domain Fields*, 2008

<sup>15</sup> *Quantum objects on show*, NATURE, | Vol 462 | 26 November 2009 (Richmond 1984)

[http://www.julianvossandreae.com/Artist/resume/articles/2009\\_11\\_26\\_Nature.pdf](http://www.julianvossandreae.com/Artist/resume/articles/2009_11_26_Nature.pdf)

<sup>16</sup> Voss-Andrae, Julian, *Quantum sculpture; art inspired by the deeper nature of reality*, Leonardo, 2011, Vol. 44 Issue 1, p15-20

<sup>17</sup> Voss-Andrae, Julian: *Science in Fine Art*, <http://viz.dwrl.utexas.edu/content/julian-voss-andrae-science-fine-art>

<sup>18</sup> Voss-Andrae, Julian, *Quantum sculpture; art inspired by the deeper nature of reality*, Leonardo, 2011, Vol. 44 Issue 1, p15-20



Initially whilst striving to capture a sense of the stuttering, vibrational nature of quantum physics, the pieces remained quite static but the discovery of the photographs of Idris Khan proved to be a breakthrough and prompted a shift in the structure of the work. Khan's enormous architectural photographs at first appear to be intricate charcoal drawings. The pieces are saturated with energy and yet retain a monolithic sense of the sublime. The images refute the static nature of the material; implying reality transcends our static viewpoint. These are qualities I wish to recreate with the figurative glass sculptures. The beginnings of this shift in perception can be seen in the work *Untitled Head*, (*Figure 1*). Using a schema of the head shape, the pieces are repeated and layered with images to set up the impression of vibrating energy.



*Figure 6, Kahn, Idris, every...Bernd and Hilla Becha  
Prison type Gasholder, 2004*

The work of Australian artist Janet Laurence also deals conceptually with these issues of creating a human experience, having a long-standing interest in the interconnection between the living and non-living, expressed alchemically by the transformation of matter into substance. Laurence's creation of experiential environments, focus upon the viewer as an active producer of meaning, suggesting a coming together of different worlds and, with it, a holistic integration of art and life.<sup>19</sup>



*Figure 7, Laurence, Janet, Verdant in Solids, detail, 2004.*  
<http://www.theage.com.au/articles/2004/05/21/1085120111843.html>

<sup>19</sup>Sherman Galleries, *JANET LAURENCE: TRANSPARATION*, 2000  
[http://www.shermangalleries.com.au/artists\\_exhib/artists/laurence/transpiration.html](http://www.shermangalleries.com.au/artists_exhib/artists/laurence/transpiration.html)

Many of the techniques employed by Laurence relate directly to my work as a glass artist, the use of transparency, layered and veiled images and the somewhat storytelling nature of the work are all devices which gain added meaning and substance. The observer is confronted with not only the image created by the artist but is asked to form a personal interpretation, one which is coloured by their personal experience and beliefs often resulting in perceptions far beyond the expectations of the creator.

The use of the observer in the work as interpreter and participant seem paramount to all these artists. The creation of an interpretation of the human experience is a defining factor in all artistic pursuits and seems fundamental in the making of any art form. These particular artists are linked by their investigation and inspiration from scientific concerns involving cognizant interaction with the world.

In contrast, to the colourful work of Laurence, an aura of quiet power is achieved by the artist Pierre Soulages with black, heavily textured canvases evoking a sense of the meditative. In 1979 Soulages made the decision to completely abandon the use of colour to formalize the concept of *outrénoir*, or ultra black, a technique he originated that emphasises the way light is reflected off of the colour black.<sup>20</sup> Soulages describes the moment he discovered *outrénoir*, '...it wasn't the black that made the picture come alive but the light reflected on the black surfaces. On the striated surfaces the light was vibrant and on the smooth areas it was calm.'<sup>21</sup> Soulages work has been described as, "constituting a near-Gnostic evocation of the crypt like darkness of the self, potentially containing – yet still awaiting – the Grace of illumination."<sup>22</sup> I must remark that I disagree with this statement, as I believe Soulages has captured a sense of the divine light manifest in the realm of deeper consciousness.

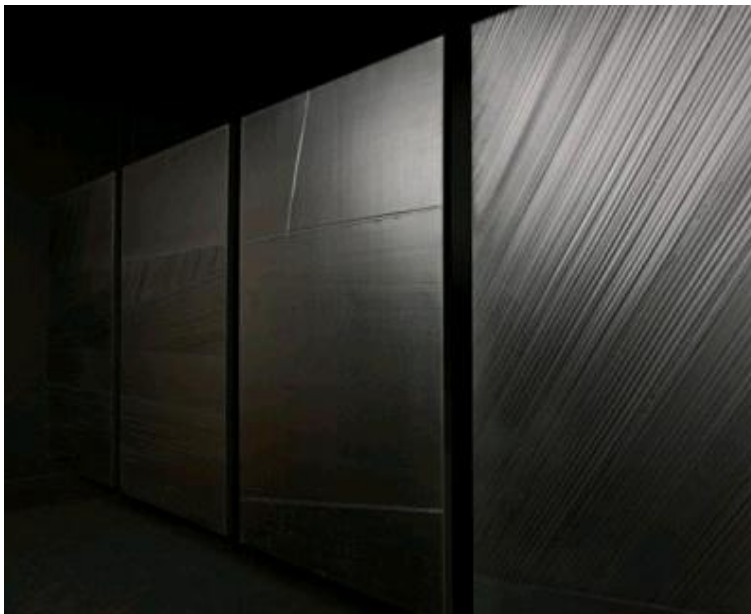


Figure 8, Soulages, Pierre, *Minimalissimo*,

<http://minimalissimo.com/2011/02/pierre-soulages/>

<sup>20</sup> Hopkins Custot Gallery, *Pierre Soulages*, London, United Kingdom, <http://www.hopkinscustotgallery.com/artists/28-Pierre-Soulages/biography/>

<sup>21</sup> Obrist, Hans-Ulrich, 'An Interview with Pierre Soulages' from *Soulages: 14 October 2009 - 8 March 2010* (Paris: Centre Pompidou, 2009)

<sup>22</sup> James, Merlin, *Review: Soulages. Paris*, *The Burlington Magazine*, Vol. 138, No. 1121 (Aug, 1996), pp. 563-564 Published by: The Burlington Magazine Publications, Ltd.

I found the work by this artist after I had begun my Ripple series, but immediately found a deep connection to the quiet intensity of this work. As with Soulages, the intention for the series of sculptural work I plan to create is to access a sense of the space within, the contemplative void that exists away from the external reality. Whilst Soulages prefers the depth of pure black to express his concerns, I opt for the soft metallic, tones of graphite which create a sensuous and inviting texture, similarly I look to the light to reflect and inform the monotone expanse of the work. The use of light to create ambience and energy to sustain the work becomes a metaphor for the metaphysical belief that light is infinite, formless potential filtered by our experience as human beings.<sup>23</sup>

## 7.0 Conclusion

Every person has their own experience of reality, each a separate and concise occurrence only able to be shared with others as an observation. The artist has the unique ability to express their version of reality through art for others to share, each observer bringing with them their own interpretation of what is seen. The use of science, in particular quantum physics as a filter for the assimilation of knowledge of what it is to be in the world is becoming increasingly included into the contemporary paradigm. The possibility of sharing a personal view of the world coloured with the possibilities of the sublime offer an exciting avenue of research and a deeper understanding of the field contains the potential for expanded potential in future work.



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<sup>23</sup> Haish, Bernard, *The God theory, Universe, Zero-point fields, and what's behind it all*, Red Wheel/Weiser, LLC, 2009, pg. 29

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## Images

Figure 1, Wedding-Marchioro, Lorry, *Untitled head*, glass reverse painted on multiple layers with glass enamels. 2011

Figure 2, Wedding-Marchioro, Lorry, *Prince of clouds*, glass reverse painted on multiple layers with glass enamels. 2011

Figure 3, Wedding-Marchioro, Lorry, *Ripple* – meditation on a pixellated paradise, 2011

Figure 4, Voss-Andreae, Julian, *Quantum man*, [viz.cwrl.utexas.edu](http://viz.cwrl.utexas.edu)

Figure 5, Kahn, Idris, *every...Bernd and Hilla Becher Prison type Gasholder*, 2004

Figure 6, Detail of *Verdant in Solids*, by Janet Laurence. Janet Laurence,  
<http://www.theage.com.au/articles/2004/05/21/1085120111843.html>

Figure 7, Soulages, Pierre, *Miminalissimo*  
<http://minimalissimo.com/2011/02/pierre-soulages/>

Figure 8, Gormley, Antony, *Domain Series*, 2008  
<http://www.dailyicon.net/2008/07/domain-series-human-forms-by-antony-gormley/>