

“The World Is Your Studio”: Identifying a Correlation Between the Idea of Minimalism in Art and the Concept of Quantum Mutual Information



Figure 1. Jeremy Kirwan-Ward and Helen Smith, *The World is Your Studio (After JD)*, *Documenta (15)*, 2022. Acrylic, wallpaper and paste. Friedrichsplatz, Kassel, Germany. Installation view.

Helen Smith, 28th September 2023

A thesis submitted in fulfilment of requirements for the degree of Master of Fine Arts
Sydney College of the Arts, Faculty of Arts and Social Sciences, The University of Sydney, Australia.

STATEMENT

This is to certify that to the best of my knowledge, the content of this thesis is my own work. This thesis has not been submitted for any degree or other purposes.

I certify that the intellectual content of this thesis is the product of my own work and that all the assistance received in preparing this thesis and sources have been acknowledged.

Helen Smith

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Helen Smith, born on Wiradjuri country (Cooma), New South Wales.

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ABSTRACT

This research project investigates the concept of minimalism in art and its connection to the theoretical practices employed to solve problems in quantum physics. By incorporating the concept of agential realism, which is derived from both quantum physics and philosophy, I aim to present a new interpretation of post-minimal art that is influenced by a formal and conceptual perspective.

Situated within the realm of contemporary painting, my artistic practice employs repetitive and undulating lines of paint, as well as site-specific works created using geometric painted-paper cut-outs. Through these techniques, I aim to explore how painting can abstractly represent time and space. The challenge of working within constraints informs my artistic process, resulting in works that systematically expand upon minimal painting and examine the containment of labour and life in a visual form.

Within this framework, a multitude of exhibition possibilities are established, and comparisons are drawn between the activity of matter on a quantum level and human responses to time and space. Physicist Karen Barad's observations of quantum weirdness and how matter behaves in the quantum realm resonate with this exploration, as they enable us to develop new ways of thinking. Additionally, ideas related to the concept of agential realism, which encompasses the nature of difference, space, time, matter, causality, and agency, are considered.

This interdisciplinary approach intersects with the fields of physics and art history, and its effectiveness is tested through distinct bodies of work.

INTRODUCTION **The Beauty of the Concept**

K.I.S. – Keep it simple. The way we view the world can be either refined and succinct or radically more complicated depending entirely on how we view our surroundings. As my art practice comes formally from a minimalist viewpoint and an interest in the sciences, this thesis will examine two working concepts utilised in the study of physics, one reductive and the other expansive, in an attempt to draw correlations between complex theories stemming from scientific research and minimalism as a philosophy that informs the arts.

Let us consider the modes of practice of two artists and two quantum physicists in the light of examining conceptual thinking that deals specifically with complexity. All four individuals acknowledge systemic practices that manoeuvre complexity into a reductive form, rendering information as not lost in this method of conceptual processing, but synthesised and contributing to a reductive outcome. This thesis will examine selected works and philosophies of artists Julian Dashper and Doreen Reid Nakamarra, both presenting complex information in a reductive visual language, alongside physicists Karen Barad and Vlatko Vedral – specifically, Barad’s theory being examined as expansive and Vedral’s theory emerging through the course of the thesis as reductive. Both concepts are equally significant philosophical methodologies that resonate in other fields of enquiry.

New Zealander Julian Dashper (1960–2009) was a significant reductive artist of his generation. In 2005, Dashper displayed works in an exhibition entitled *The World is Your Studio* (in collaboration with Australian artist John Nixon) at Gus Fisher Gallery, the University of Auckland. The working concept of the exhibition challenged restrictions principally curtailed by time and space. For example, materials for exhibitions could be posted to other parts of the world, or sourced directly on arrival as was the case with the Gus Fisher exhibition. In other instances, recordings or documentation could be exhibited rather than the actual artworks, as exhibiting restrictions encountered by distance were replaced by lateral solutions. My studio research is posited in dialogue with methodologies relative to Dashper’s subversions of distance and space, and various examples are presented in this thesis with the working title *The World is Your Studio (after JD)*.

Doreen Reid Nakamarra (c.1955–2009) was a member of the Papunya Tula artist group located in Central Australia, 32 kilometres north of the MacDonnell Ranges, and her vivid paintings record a landscape mapped and conceptualised in a pictorial syntax. A concept of time that defies Einsteinian concepts is acknowledged and discussed relative to the cultural lore of the inhabitants of this region, as the agency of those past, present, and future are perpetually embedded within the land. Notably, Nakamarra’s work was featured in *Documenta (13)* in Kassel, Germany, in 2012, where she presented a global audience with principally two-colour paintings featuring optically challenging linework with an almost holographic effect. These stunning works could be interpreted equally as folds in the landscape or as folding time.

Karen Barad (b. 1956) is an American physicist and feminist theorist whose work speaks of a theory of agential realism that discusses the atomic building blocks of both human and non-human entities. Barad significantly reworks understandings of space, time, matter, causality, agency, subjectivity, and objectivity in an agential realist account, in which the world is made of entanglements of “social” and “natural” agencies, where the distinction between the two emerges out of specific

intra-actions.¹ This concept of rearranging temporal and spatial conceptions in an unconventional structure draws a strong link to ideas about entanglement and concepts of “quantum weirdness.”²

Serbian physicist Vlatko Vedral (b. 1971) is recognised critically for his research into the theory of quantum entanglement and quantum mutual information theory, both of interest in this paper with respect to the logic of his conceptual reductive theories and the subversion of traditional Western conceptualisations of time and space.

The distillation of reams of information into a pure form in the work of all four of these extraordinary individuals is crucial to this thesis, which endeavours to draw correlations that encapsulate the philosophies and working practices of each alongside working traits evident in my own studio-based (or “World Studio-based”) works, both built and conceptual.

In Chapter 1, Julian Dashper’s practice and writings, including his “idea of minimalism” and *The World is Your Studio* exhibition in Auckland, will be discussed alongside ideas relative to expanded painting. Discussions relative to expanding or enriching ideas will then be examined through the working principles of the structuralists’ graph. Levels of complexity are considered in both Dashper’s practice and the theoretical model of the graph, and Karen Barad’s theory of agential realism will be introduced to the conversation as a binding agent that encapsulates the concepts as they are revealed.

Chapter 2 will focus on a merger of science and humanity within a visual syntax. Concepts of time and perception are questioned, relative to Indigenous culture, by researching the work of Doreen Reid Nakamarra. Representations of the natural world are discussed in relation to understandings of visual perception. What is “normal” is questioned as correlations between the concepts used to investigate the quantum are juxtaposed with cultural understandings. It is Barad’s and Vedral’s conceptual way of thinking that is significant in this chapter, as the blurring of boundaries that separate science and the humanities is questioned.

In Chapter 3, Vedral’s concept of quantum mutual information will be discussed relative to science and philosophy, and correlations and interconnections will be traced between conceptual thinking and theories burgeoning from quantum science. My practical contribution to this project is sited within the field of contemporary conceptual art, which attempts to demonstrate how art can abstractly represent a concordance between the visual and the quantum level as implied in this research. Works that respond to the challenge of geometric laws and visual constraints emerge systematically to explore concepts of post minimal art. Within this framework, comparisons between painting and the activity of matter on a quantum level provide some interesting parameters. By entangling the fields of physics and art history, the efficacy of this approach is tested via distinct bodies of work. The question is, can comprehensive thought processes used in the study of quantum physics be linked with a minimal visual language? Let us see. Certainly the richness of the contributions of Dashper and Nakamarra to the arts will be reiterated in this exploration that attempts to draw vertiginous connections between theories burgeoning from science and minimalism as a working method that informs the arts.

¹ Karen Barad, *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning* (Durham, London: Duke University Press, 2007). 73.

² Barad, *Meeting the Universe Halfway*. 83.



Figure 2.
Julian Dashper in diving suit,
Auckland circa 1969.

I was forced to become a minimalist. Or that is what I still like to tell people. Coming from where I come from, I had no choice. Or that is what I like to say. Shipping things long distances affects the way that I make them in the first place. In 1990 that problem first became a subject in my work. By 2000, that subject had disappeared and become a method instead. A method that I did not think about any more. Much like getting dressed. It was just something that you do. Which clothes you choose is another story. It is all about how you get ‘into the zone,’ after all. I am also fond of telling people that I consider minimalism to be a verb of sorts. Not a noun. Not really an adjective either. More of a verb. A doing word, as I learnt in my astronaut’s costume back in the early 1960s. A word that expresses the idea of an action. The idea of minimalism.³

– Julian Dashper, Untitled (on the 4th July) 2005.

³ Christopher Cook, Raskin, David, *Midwestern Unlike You and Me: New Zealand's Julian Dashper*, ed. Sioux City Art Centre. (Sioux City, Iowa: Sioux City Art Centre, 2005).

Eating, drinking, working and making love. These are all defining verbs that describe prosaic life and Dashper chooses to schedule minimalism into his daily mix. Perhaps the origins for this way of thinking could be traced back to Kazimir Malevich and his homage to the black square, with Marcel Duchamp also contributing to the conversation by way of ready-mades.

Minimalism in art was essentially born from subversive concepts proposed by the work of Duchamp and Malevich in 1915. Then from 1910-40s, American artist Frank Stella was one of the first of a cohort of colleagues including Carl Andre, Dan Flavin, Donald Judd, Sol LeWitt, Agnes Martin, Robert Morris, Blinky Palermo, and the European contingent including Francois Morellet, Camille Graeser, Imi Knoebel, Richard Paul Lohse, and Frantisek Kupka, to name a few. All practised this reductive extension of abstract art that essentially referenced itself, featuring geometric shapes, squares, and rectangles. As Frank Stella proclaimed, "What you see is what you see."⁴

Minimalism, an art movement that principally heralded a departure from the figurative and blended ideas associated with conceptual art and reductivism, over the next few decades had reverted to artworks that were complicated in concept, of reductive ideology, and contained a complex, minimal fold back.

Chronologically speaking, in the late 20th and early 21st century came a new minimalism, a Neo-Minimalism, Neo-Geo (as it clumsily related to the Neo-Geometric), and with the swing of a pendulum this genre emerged as a more complex rendition of minimalism. The bundle of artists from this genre includes Peter Halley, Charles Bezie, Eve Leader, Liam Gillick and Rudolf de Crignis. Whilst practising during this time, Dashper, however, refrained from using this term (Neo-Minimalism) in his writing, but in hindsight it could be suggested that his practice appears to be sympathetic to the "living labour"⁵ agency of this movement by way of utilising "an elastic notion of painting."⁶

It is the year 1960 in Auckland where Dashper was born on the 29 February. He grew up in a modernist house designed and built by his father, and saw himself as being cursed by two dispositions relating to both time and space. The first was the event of having a birthday every four years and the second was emerging from art school in New Zealand in the 1980s, seemingly far removed from global activities in the art world. Growing up in a close-knit community he studied art at the Elam School of Art, the University of Auckland emerging as a conceptual artist aware of the restraints associated with his island home, remotely located in the south-western Pacific Ocean.

It is apparent that at some point early in his artistic career, Dashper makes a contrary choice to disregard New Zealand's global isolation by transforming this disadvantageous tyranny of distance into a positive vector. "It is an irony of our time that New Zealand's distance is an advantage to us. That very distance whose obstacle shaped our past will continue to affect us by placing us in a fresh context. Distance is no longer an excuse but has instead become an introduction."⁷ Julian Dashper, *Artist's Notes*, 1990.

It is evident within his *Artist's Notes* and through the materiality of text, Dashper developed a system of language that involved an interchange between the use of nouns and verbs as a method of concrete writing. By so doing he adeptly truncated the notion of distance by ultimately redefining

⁴ "Minimalism," Tate Gallery, 2023, 2022, <https://www.tate.org.uk> (Art Term).

⁵ Isabelle Graw, *Painting Beyond Itself: the medium in the post modern condition* (Berlin: Sternberg Press, 2016). 90.

⁶ Graw, *Painting Beyond Itself*. 90.

⁷ Francis Pound, *Julian Dashper, 1991*, "Dashper & Distance." Exhibition catalogue. (Auckland, New Zealand: Sue Crockford Gallery, 1991).

the concept as an “introduction.” This method of rearranging words in a variable linguistic collage is a mechanism that both informed his practice and altered perceptions of his artworks. This subversive working method will be discussed later in this chapter, relative to the concept of the structuralists’ graph, to demonstrate how Julian Dashper’s “idea of minimalism” becomes significant as an informative working method.

Early in Dashper’s career he pondered on who were New Zealand’s “canonical modernist masters”⁸ and discovered that actually, there were none. Slides of the European equivalent would be shown during Art History lessons at Elam Art College, with these pictorial reference points shown as distant indications (only) of the real thing – an actual artwork. Dashper was charmed by the paradox of looking at the reproduction of an artwork as the real object and responded with an artwork that was shown for the exhibition titled *Julian Dashper*, at Sue Crockford Gallery in Auckland in 1991. In this exhibition, he presented slides of his own modernist painting (based loosely on Butcher’s awnings) as a grid of twenty (by twenty slides) in clear plastic sleeves. Each individual slide had a slightly different exposure, rendering all components (or sections) of the work to be originals, two hundred slides in total. *Untitled (slides 0-200)* is a conceptually beautiful work that is extensively both minimal and complex. All the aspects of production are considered, with slide film coming from America, being processed in Australia and the filing sheets a German product made in Japan under a US patent.

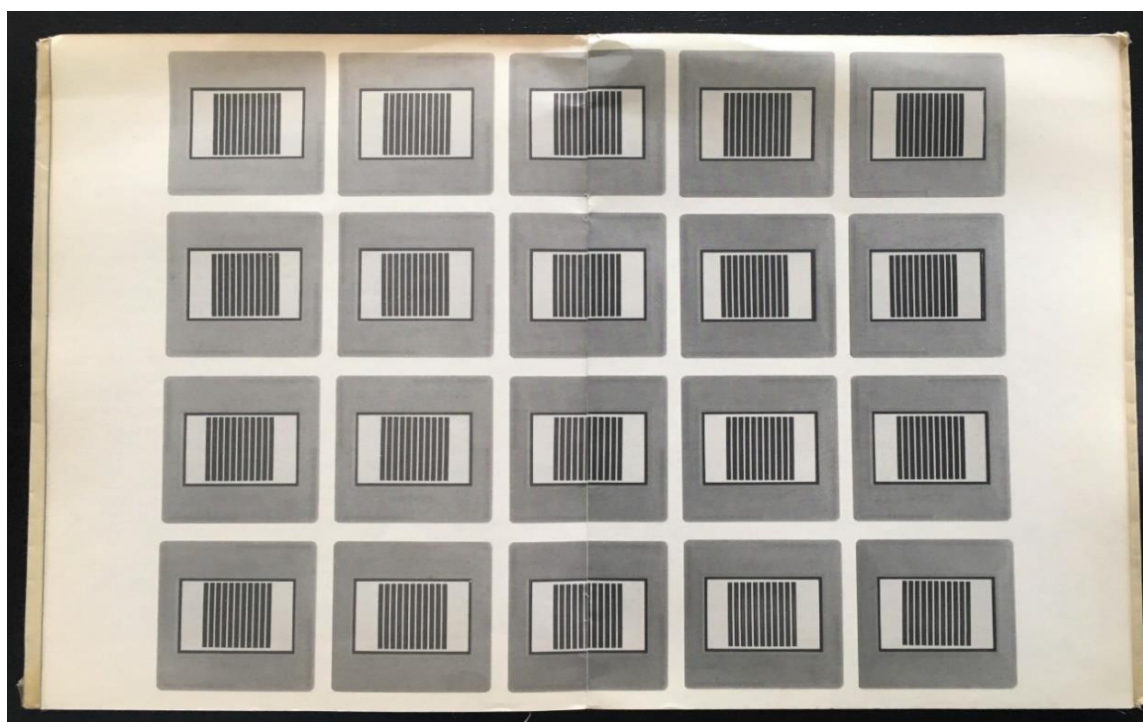


Figure 3. Julian Dashper, *Untitled (slides 6-25)*, 1991. Photographic slides, presentation sleeve, 23 x 31 cm. Sue Crockford Gallery, New Zealand. Exhibition catalogue.

⁸ Pound, *Julian Dashper*, 1991. Exhibition catalogue.



Figure 4. Julian Dashper, *Untitled*, 1991. Printed industrial canvas. Courtesy of the artist and Sue Crockford Gallery, New Zealand. Exhibition catalogue. Collection of Te Papa Tongarewa.

It is the understanding and consideration of all these elements that contribute to the work by showing the actual slides and not the projection, which informs the conceptual premise of the work. Dashper is critiquing, processing, and distilling what we generally give little thought to, its agency subverting time and place. Specifically, and consequently, by distancing us from the norm, he draws us closer to residual universal structures. This is an important consideration in the context of the thesis; this methodology that considers the complexity of multiple factors that contribute to an outcome will be discussed alongside conceptual methodologies used as research within the quantum realm later in Chapter 3.

Discussions relative to this mode of practice can be seen as the “residual specificity”⁹ working to effect. Contemporary theorist Isabelle Graw describes this phenomenon as artworks, “that push beyond the edge of the frame, while still holding onto the specificity of the picture canvas and to the variation of painting.”¹⁰ Dashper is constantly subverting the paradigm through his ability to fold the idea back onto itself, with results in the efficiency of an “expanded conception of painting.”¹¹ By exploiting the current modes of practice and moving beyond hermetic constructs, we edge closer to a way of constructing a reality within reality, and ideas of entanglement relative to quantum physics, an idea that will be expanded in the following chapters.

Another example of this oblique way of working, ultimately offering a myriad of possibilities is evident in Dashper’s exhibition *The World is Your Studio* at Gus Fisher Gallery in 2005, made in collaboration with Australian artist John Nixon, as mentioned in the Introduction. In the exhibition, the South Pacific Island neighbours Australia and New Zealand appear as a grand piano and a drum kit respectively. “On seeing the exhibition for the first time, the placement of the two musical instruments reminded me of a map of Australasia,”¹² remarks Mark Kirby in his essay in the exhibition catalogue. The use of ready-mades was already well established in the practices of both artists, with a passing tip of the hat to Duchamp. Nixon’s contribution was an assemblage titled *Blue Rider 1994* consisting of a grand piano accompanied by four red monochromes and Dashper’s offering, titled *The Warriors 1998* consisted of a painted drum kit, the title referencing both his island heritage (along with his love for rugby union) and the use of everyday materials. Dashper’s laconic, dry humour comes to the fore in his choice of a child’s drum kit, the inference being that New Zealand is the younger sibling of Australia.

⁹ Isabelle Graw, “The Value of Liveliness: Painting as an Index of Agency in the New Economy,” in *Painting Beyond Itself* (Berlin: Sternberg Press, 2016). 90.

¹⁰ Graw, “The Value of Liveliness”. 90.

¹¹ Isabelle Graw, *The Love of Painting, Genealogy of a Success Medium* (Berlin: Sternberg Press, 2018). 151.

¹² Robin Stoney, Ben Curnow and Mark Kirby, Julian Dashper/John Nixon: “The World is Your Studio,” ed. University of Auckland. The Gus Fisher Gallery (Auckland. New Zealand.: The Gus Fisher Gallery, 2005). 9.



Figure 5. Julian Dashper and John Nixon, *The World is Your Studio*, Gus Fisher Gallery, University of Auckland, 2005. Installation view.

This idea of borrowing materials on location (the grand piano in Nixon's case) coupled with travelling distances to stage exhibitions, fed and even informed many works and would facilitate a working empirical concept. The title *The World is Your Studio* implies that the constraints of distance and space simply do not exist. Anything is possible as the enormity of the world is scaled alongside the small artist's studio, and vice versa. By considering this concept of rearranging temporal and spatial ideas in a nonlinear structure, parallels with quantum science emerge and can be related strongly to ideas of "quantum weirdness,"¹³ or the notion of things happening simultaneously. By expanding dialectic materialism born out of the philosophies of Karl Marx and Friedrich Engels, Barad shows us how the study of matter in physics enables us, "to produce a new way of thinking about the nature of difference, and of space, time, matter causality and agency."¹⁴ Barad defines this nascent concept as agential realism.

¹³ Barad, *Meeting the Universe Halfway*. 73.

¹⁴ Barad, *Meeting the Universe Halfway*. 73.

“The World is Your Studio” as a Concept

The World is Your Studio (after JD) emerges as a conceptual model as a homage to Dashper’s mimesis and his “idea of minimalism.” These unauthorised, subversive, ephemeral, location-based works, pasted on to a global support (or canvas) ideally sit within the confines of Barad’s concept of agential realism.

Conceptually I find this subversion of time, space, and agency fascinating and, in 2022, a collaborative project of mine with artist Jeremy Kirwan-Ward, *The World is Your Studio, 2022 (After JD)*, was staged at two major international art exhibitions on the global calendar. We were not formally invited to participate in either of the official exhibitions; rather, these projects of my own volition were an auxiliary curatorial premise staged as satellite events, clandestine in their nature and set up as a counter to hegemonic forces.

The first of these collaborative events was shown simultaneously with the Indonesian collective ruangrupa’s curation (specifically spelt with a lower case ‘r’) at *Documenta (15)* in 2022 in Kassel, Germany, and the second alongside *The Milk of Dreams* exhibition at the 59th Venice Biennale, that same year. ruangrupa used the curatorial premise of, “the collective’s way of working” based on ideals, “in which resources, ideas or knowledge are shared, as well as social participation.”¹⁵ Both events seemed to invite an intervention by way of social and political content. Subsequently I invited Kirwan-Ward to exhibit alongside me and make a work specifically for both locations. Kirwan-Ward’s striking, rectangular minimal geometric, colour contribution and my (intentionally contrasting) elliptical shaped monochromatic works, were both painted on cut wallpaper shapes prior to the trip and rolled into hand luggage within the protective confines of a cardboard tube. Once in Kassel and Venice, a suitable location was determined by both collaborators, and the works were pasted in place as an act of transitivity, a temporal passage of play that places these artworks within the frameworks of Dashper and Nixon’s initial premise for *The World is Your Studio*. The exhibition events would come under the auspice of “discrete” satellite exhibitions and open without ceremony or even anyone being aware of them — literally non-events.

¹⁵ "Documenta (15), 2022," 2022. <https://documenta-fifteen.de/en/>



Figure 6. Jeremy Kirwan-Ward and Helen Smith, *The World is Your Studio (After JD)*, Documenta (15), 2022. Friedrichsplatz, Kassel, Germany. Installation view.



Figure 7 and Figure 8. Jeremy Kirwan-Ward and Helen Smith, *The World is Your Studio (After JD)*, Documenta (15), 2022. Acrylic, wallpaper and paste, dimensions variable. Friedrichsplatz, Kassel, Germany. Detailed installation view.



Figure 9. Jeremy Kirwan-Ward and Helen Smith, *The World is Your Studio (After JD)*, 59th Venice Biennale, 2022. Via Garibaldi, Venice, Italy. Installation view.



Figure 10. Jeremy Kirwan-Ward and Helen Smith, *The World is Your Studio (After JD)*, 59th Venice Biennale, 2022. Acrylic, wallpaper and paste. Via Garibaldi, Venice, Italy. Detailed installation view.

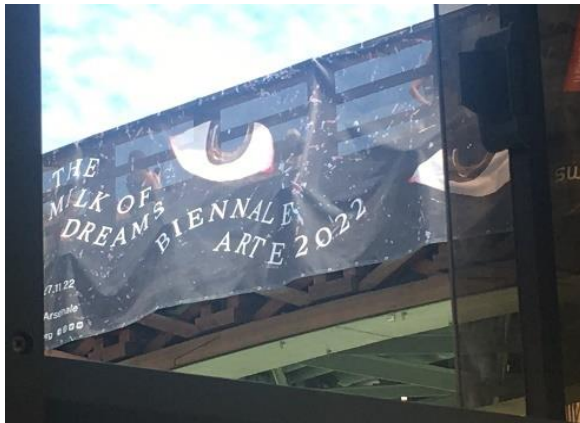


Figure 11 and Figure 12. *The Milk of Dreams*, 59th Venice Biennale, 2022.

In both exhibitions, the works were well received by a small group of “onlookers.” In attendance at the Via Garibaldi location opening was a young local adolescent, followed shortly afterwards by a small cluster of unwitting tourists. And similarly, in Kassel the opening was warmly received by the attendant working in a nearby sex shop, who was enjoying a brief interlude outside with a cigarette.

Showing these exhibitions simultaneously in different parts of the world for instance and revisiting an exhibition that occurred thirty years ago, are examples of a mode of practice that dabbles with the concept of time travel within a real-time paradigm. An asynchronous way of thinking and working is complicit in all these works that are enclosed in a logic that can fold in and expand simultaneously, unconstrained by the limitations of time and space.

Art critic and independent curator Peio Aguirre discusses this phenomenon as, “The desire to play with time, to base narrative on historical periods ranging from the past to the future and back again (in a past-present-future ‘Pop’ dialect), is consistent with the elliptical narrative technique.”¹⁶

On another level, Barad also writes eloquently about the concept of space–time as rift in established linear temporal concepts. Barad asks us to consider the nature of “entanglement in quantum states”¹⁷ where the construct suggests that matter can move in all directions, a glissando of tracings that are simultaneously moving forward, sideways, and backwards. “The point is that the specificity of entanglement is everything.”¹⁸ This is a core idea relative to the nonphysical world, the metaphysical world, and Barad is of the view that everything in the non-material and the material world is in flux and entangled intra-acting agencies.

¹⁶ Peio Aguirre, “Elusive Social Forms,” in *Meaning Liam Gillick*, ed. Monika Szewczyk (Cambridge, Massachusetts London England: The MIT Press, 2009). 11.

¹⁷ Barad, *Meeting the Universe Halfway*. 73.

¹⁸ Barad, *Meeting the Universe Halfway*. 74.

Dashper's "idea of minimalism" and the Structuralists' Graph

This consideration of time as a looped concept is discussed by Dashper in his paper "Legacy of Minimalism" delivered at the School of the Art Institute of Chicago in 2001. In this paper he takes a lateral viewpoint to linear notions of time and sets up an argument to substantiate the value of other temporal alternatives,

But what is interesting to find out when you study art history, as you find out when you study any history at all, is that people change the way they think over time. Sure, they think the same way about many issues. Such as war, death, and love. But what time does let us think about is a new way to see things and a new context to understand it in. Perhaps the legacy of minimalism is time itself?¹⁹

– Julian Dashper, 2001.

I would suggest here that Dashper is taking the two nouns minimalism and time, both with different meanings, and through a kind of sublimation, a very similar process existing in the concept of mutual information, he identifies a commonality sought from difference. The question is, does this linguistic process eliminate the meaning of time or the meaning of minimalism or does it extract a complexity for both? If we introduce Rosalind Krauss's reading of the structuralists' graph to this conversation, I will argue in favour of the latter.

Rosalind E. Krauss is an American art critic, art theorist and a professor at Columbia University in New York City. Krauss explains that the structuralists' graph demonstrates Lacan's theory of value and Krauss expands on this idea by stating that the concept, "is speaking of the system through which culture generates meaning not by naming things, but by opposing two values within a structure: S/-S]."²⁰

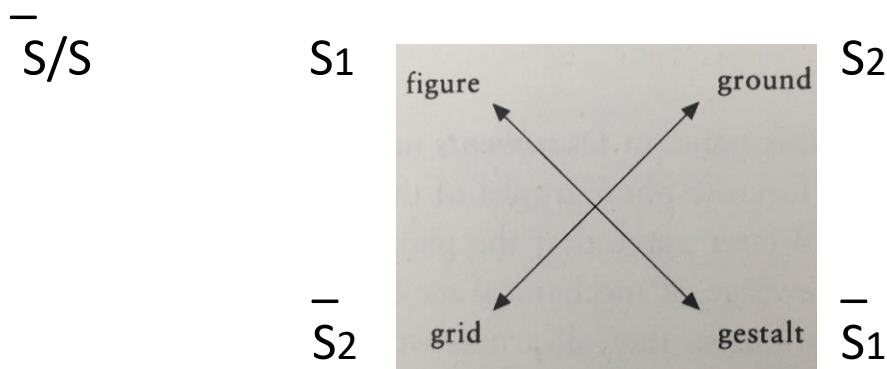


Figure 13. The structuralists' graph as referenced by Rosalind E. Krauss. *The Optical Unconscious*.

¹⁹ Julian Dashper, *This is not writing*, "Legacy of Minimalism," School of the Art Institute of Chicago, 2001, ed. Gwynneth Porter, ed. Gwynneth Porter (Auckland: Sue Crockford Gallery, 2010). 100.

²⁰ Rosalind Krauss, *The Optical Unconscious* (Massachusetts: Massachusetts Institute of Technology, 1993). 192.

By utilising the graph an idea instead becomes “radically not simple.”²¹ The graph is significant in that it is compartmentalising four areas of philosophy — the grid, gestalt, ground, and figure — and drawing on unnatural opposing forces. By utilizing the graph as a conceptual tool an element of complexity is concealed within the framework just as Dashper’s working method oscillates between complexity and minimalism, the former embedded in the latter.

In my invocation of the structuralists’ graph, ideas seep from philosophy into the sciences, allowing ontological discussions to emerge. Think of an intricate, minimal fold back of ideas, concepts and possibilities aligned with science and art, complexity and minimalism, time and space. By using the graph, a push and pull of spatial and temporal modes of thinking could blur boundaries between established fields of enquiry. As Krauss proposes, the structuralists’ graph is, “speaking of a system through which culture generates meaning not by naming things, but by opposing two values within a structure. In this structure logic is binary — yes/no”²² scenario, a “superposition.”²³

By incorporating the structuralists’ graph in the conversation we find that the element of enrichment, as a defining component of perception, facilitates imaginative thought that bridges the polarising elements of grid and ground. Krauss succinctly observes that the structuralists’ graph, is a way of, “picturing the whole culture universe in the grip of two opposing choices, two incompatible possibilities. Cultural production is the creation of an imaginative space in which those two things can be related. The conflict will not go away. But it will be, as it were, suspended.”²⁴

Concepts can be equally extrapolated or compressed within this structure that deals with binaries and opposites where ideas swell and diminish within the confines of the square. Much of the work, both writing and visual art, in Dashper’s practice displayed these traits. He is subverting language and through his titles, objects and artworks, this nexus enabling a new meaning and a new reading of the world and its limitations. Concrete poetry and art reside happily within the hermetic confines of the structuralist graph. It is minimal and complex. A yes/no system of the binary where the idea of boundaries in dialectic materialism, necessitates the use of reductive concepts.

Krauss is speaking of the structuralists’ graph but equally, the reference could apply to the concept of quantum mutual information. By positing Vedral’s concept of quantum mutual information in physics (discussed in Chapter 3) with Dashper’s tendency to condense vast amounts of information into minimal gestalts, we can also begin to draw correlations with information processing, for both scientific and philosophical enquiries. As Krauss observes, “By showing me the system whole, it showed me my own outsideness to it. But also gave me a way of picturing what it had been like to be inside, where its choices seemed to compose a whole universe: the universe of ‘vision.’”²⁵

²¹ Krauss, *The Optical Unconscious*. 186.

²² Krauss, *The Optical Unconscious*. 20.

²³ Barad, *Meeting the Universe Halfway*. 76.

²⁴ Krauss, *The Optical Unconscious*. 186.

²⁵ Krauss, *The Optical Unconscious*. 20.

CHAPTER 2 “The Universe of Vision”: Time, Line and Perception

In Chapter 1, dialectical comparisons between Dashper’s idea of minimalism and the structuralists’ graph are identified alongside the research project *The World Is Your Studio (After JD)*. In this chapter, Duchamp’s dalliance in the fourth dimension incorporating experiments relative to temporal and spatial understanding are presented alongside the complex optical paintings of Doreen Reid Nakamarra. These will be discussed (in relation to my *Blue Highway* series) as I explore the tension between materialism and the quantum to discuss the spatial, temporal, and relative tendencies of curved lines connecting points, places, and moments in time.

Duchamp and the Fourth Dimension

In quantum states, time is not seen as a linear concept and early artistic renditions of this notion are evident in the work of Marcel Duchamp (1887–1968). His contribution to shifts in conceptual art practices were pivotal and set him apart from his peers by inverting conventional artistic paradigms invariably with the use of ready-mades and a sense of humour.

Duchamp experimented with optical illusions fed by his avid interest in writings related to hermeticism and alchemy.²⁶ Duchamp’s minimal artwork was groundbreaking in challenging the conventions of art and science. His work *Bicycle Wheel*, 1913 contained two readymade elements, principally a circle and a square (squaring the circle) and the composition of found objects referenced succinctly the Russian occultist P.D. Ouspensky’s theories about the fourth dimension.²⁷ The sculpture’s minimal qualities speak of motion, surface, and time in a static form. Equally complex and minimal, it signified his interests in alchemy and the circular principle of the Ouroboros, which at time, signalled a shift to reductive forms of art.²⁸

Duchamp’s work *Rotary Glass Plates* was completed in collaboration with May Ray in 1920. This piece was constructed of spinning rectangular blades that appear as a circular plate-like shape, solid in form. The work presents as an experimentation of optical effects that alter perception, and in “Marcel Duchamp: Alchemist of the Avant-Garde” John F. Moffitt interprets these objects as, “A metaphor expressing the transmutation of non-matter into apparent matter.”²⁹ Seemingly an apparition, this work now has a scientific basis and relates to a melding of space and matter, the agency of multiple factors working simultaneously.

²⁶ John F. Moffitt, “Marcel Duchamp: Alchemist of the Avant-Garde,” in *The Spiritual in Art: Abstract Painting (1890-1985)*. 262.

²⁷ Moffitt, “Marcel Duchamp: Alchemist of the Avant-Garde.” 264.

²⁸ Moffitt, “Marcel Duchamp: Alchemist of the Avant-Garde.” 257.

²⁹ Moffitt, “Marcel Duchamp: Alchemist of the Avant-Garde.” 256.



Figure 14. Marcel Duchamp, *Bicycle Wheel*, 1913. Metal wheel mounted, 130 x 64 x 42 cm. (Left).

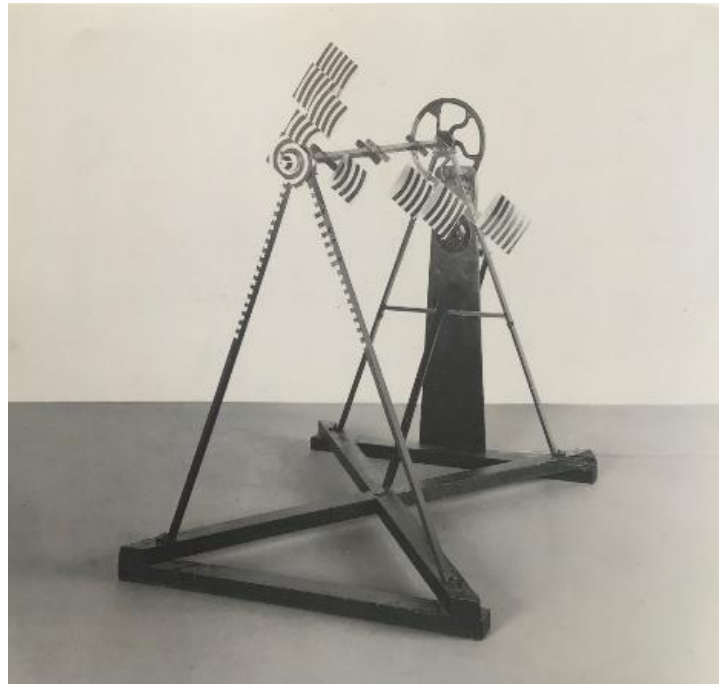


Figure 15. Marcel Duchamp and Man Ray, *Rotary Glass Plates*, 1920. Painted glass, iron, electric motor, and mixed media, 165.7 x 157.5 x 96.5 cm. (Right).

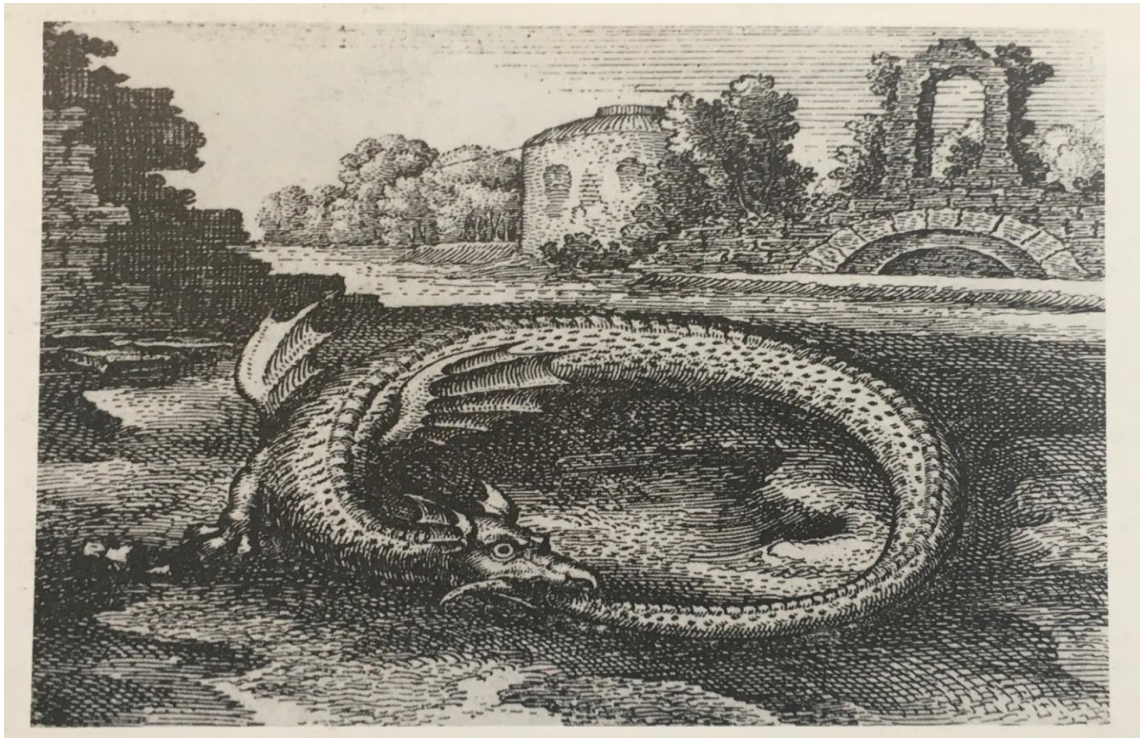


Figure 16. Michael Maier, *The Alchemical Ouroboros*, from *Atalanta fugiens* (1617/8).

Duchamp's renditions of time as nonlinear can be considered alongside the abstract interpretations of temporal ideas in minimal art, as he questions Western concepts of past, present and future. He implies that linear concepts of time can be curved, an idea mirrored in the understandings of those who live in direct proximity with the land and recognise the cultural significance of nature. At this point in the conversation, I'd like to introduce the work of Doreen Reid Nakamarra, a significant contemporary First Nations artist.

Doreen Reid Nakamarra

Doreen Reid Nakamarra (c. 1955-2009) was born and lived on Papunya land and worked with the Papunya Tula Artists collective, located in Central Australia, where First Nations populations have lived for over 60,000 years. It is a place where traditional understandings of the time and country spanning this period and into the future are intertwined, interconnected as a perpetual loop, where Western concepts of time unravel and energy fields, "suggestive of invisible forces, exist as a cultural charge of ceremony."³⁰



Figure 17. Doreen Reid Nakamarra, *Untitled*, 2009. Synthetic polymer paint on linen, 183 x 244cm. Exhibited in *Documenta (13)*, 2012. Collection of National Gallery of Australia.

³⁰ Eva Scharrer, "Documenta (13)," in *The Guidebook 3/3*, ed. Documenta and Museum Friderician (Kassel, Germany: Hatje Cantz Verlag, 2012). 112.

The manager of the Papunya Tula Artists community, Andrew Croker, referred to Papunya Tula paintings being effective at a number of levels – as “mnemonics for the stories depicted”³¹ (which are also sung) and as, “cartographic mnemonics which inform and remind of topography and proprietary rights according to Aboriginal law.”³² Nakamarra’s mesmerising linework describes structure and form. Though little is written about this extraordinary artist, her paintings (both minimal and complex) undulate in front of the eye, as linework folds back and forth to create a spatial illusion, unfurling in a non-veridical viewing experience.

Diastolic and systolic rhythm and movement are the hallmarks of Nakamarra’s paintings and I first experienced these extraordinary works at *Documenta (13)*, 2012 in Kassel. Her radically illusionary works were displayed horizontally on tables, and consisted of lines zigzagging across the painting plane, ribbons of folds and crumples rising from the flat surface of the works. My interest in this illusory phenomenon was born out of this extraordinary experience of seeing Nakamarra’s work and subsequently informed my *Blue Highway* series of paintings.

Nakamarra’s formalist linework emulates as a systematic strobing of lines relative to place and whilst perceptually non-veridical, and the works could perhaps be interpreted as folded land or, equally, as folded time. Luke Scholes, curator and Associate Research Fellow at Deakin University, visited the Kiwirrkurra Community where the artist lived and in a conversation with her in 2008 Nakamarra stated that she painted these works, “For white fellas to see the country like I do.”³³ Rippling sand hills of Kiwirrkurra come to life in non-veridical experiences that move with the gaze. The inherent closeness of one with nature is there, the “specific indexicality”³⁴ of one with Country.

As a “white fella” her works *do* speak to me, a limited palette and an exacting sequence of undulating lines that talk about landscape and space, may also conceptually encapsulate the past, present, and the future. A rupture, a rapture, a geographical and quotidian meeting, in works that are made of and on the land where Nakamarra lives.

In her article entitled “The face of the centre: Papunya Tula paintings,” curator Annemarie Brody identifies, “the way in which particular terrain and stretches of country are represented in paintings varies according to stylist (tribal and individual) factors. However, whilst many images are actual topographies, they should not be interpreted as scale maps in a Western sense.”³⁵ Significantly, these works can be viewed on the horizontal or vertically as an imagined aerial perspective, demonstrating an additional level of complexity relative to Indigenous concepts of time and place. The result is a spiritual place that could be posited with Barad’s consideration of temporal materiality, “past, present, and future, not in a relation of linear unfolding, but threaded through one another in a nonlinear enfolding of spacetime mattering.”³⁶ A configuration that encompasses the past, present and future, where, “Time is not a succession of evenly spaced individual moments.”³⁷

³¹ Andrew Crocker, *Mr Sandman bring me a Dream*, ed. Andrew Crocker (Alice Springs, Northern Territory: Aboriginal Artists Agency with Papunya Tula Artists Pty. Ltd., 1981). 10.

³² Crocker, *Mr Sandman bring me a Dream*. 10.

³³ Luke Scholes, “Kiwirrkurra women: The shifting shape of Western Desert painting,” *Art & Australia* (2008). 505.

³⁴ Graw, *Painting Beyond Itself*. 90.

³⁵ Brody, “The Face of the Centre: Papunya Tula Paintings 1971-84.” 8.

³⁶ “Additional reading - Barad 2010 quantum entanglements PDF,” 2010, <https://www.scribd.com/document/632911850/additional-reading-Barad-2010-Quantum-Entanglements-pdf>.

³⁷ Barad, *Meeting the Universe Halfway*. Chap.4, Kindle file.

This concept is reiterated in the writings of Tara June Winch. Her book *The Yield* received the 2020 Miles Franklin Award for Australian literature and through a celebration of Wiradjuri language a poignant narrative evolves. Consider the word “Ngurambang”³⁸ meaning country. “Every person around should learn the word for country in old language, the first language – because that is the way to all time, to time travel! You can go all the way back!”³⁹ The character Jedda is not talking about some time or any time, it is *all time* that is considered.

Always be, exist – ngiyawaygunhanha

A person exists beyond the living and the dead, in the planes of time where gods roam, when they know the seen and unseen at once. That is to be ngiyawaygunhanha.

– Tara June Winch

Another poignant quote alluding to perceptions of time, place and the quantum can be found in the recent publication *The Best Australian Science Writing 2022*. In her article “Time travel and tipping points”, Lauren Fuge interviews Michael-Shawn Fletcher, a Wiradjuri man working in the Geography Department of the University of Melbourne. In Fuge’s essay he states, “according to our understanding, we’ve always been here. This linear notion of a sequence of events in time doesn’t exist – stories of the past are wrapped up into understandings of the present ... The agents that made the landscapes and Country are still very much with us today, and they need to be serviced and understood and respected.”⁴⁰

We need to listen to each other.

³⁸ Winch, *The Yield*. 12.

³⁹ Winch, *The Yield*. 12.

⁴⁰ Lauren Fuge, “Time travel and tipping points,” ed. Ivy Shih, in *The Best Australian Science Writing 2022*. (NewSouth Books, 2022). 184.



Figure 18. Doreen Reid Nakamarra, *Untitled*, 2009. *Documenta (13)*, 2012. Exhibition view.



Figure 19. Doreen Reid Nakamarra, installation view of works exhibited in *Documenta (13)*, 2012.

Fletcher goes on to state that, "Whatever happens to the land happens to the people, and whatever happens to the people happens to the land."⁴¹ Perhaps this may be compared to British anthropologist Tim Ingold's coiling over principle, which I will expand upon shortly and argue that indigenous peoples have invaluable knowledge relative to the structure of the universe and the nature of the world.

If we consider the findings of Ingold in his essay "The life of Lines", we can draw correlations with indigenous peoples from the northern hemisphere.

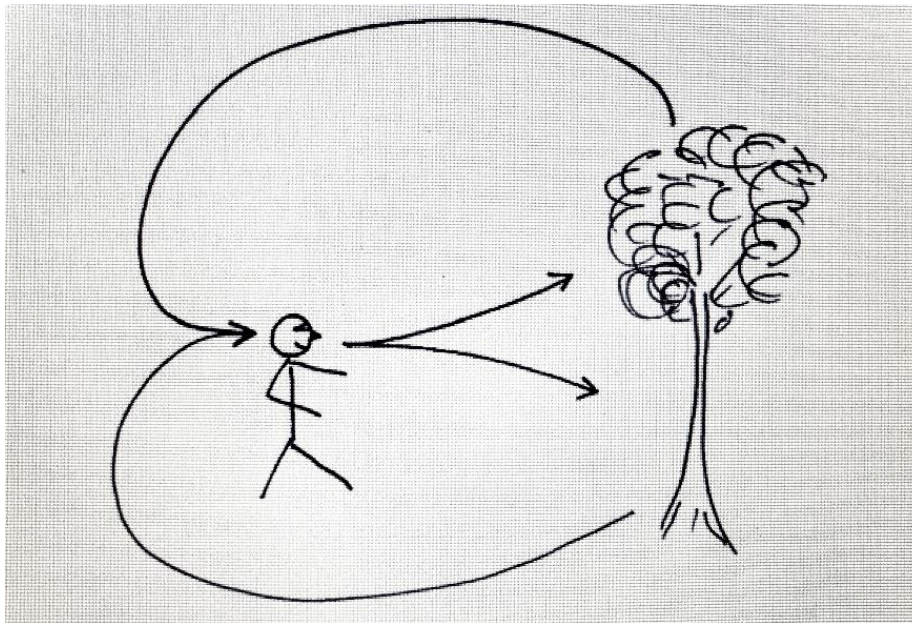


Figure 20. Tim Ingold, "coiling over" principle, *The Life of Lines*.

... if I were a Tlingit person, my listening to the glacier would be the way the glacier listens through me. Neither tree, stone nor glacier is in itself sentient. But immersed in sentience, each can, as it were, double back so as to see, touch and hear itself. In this 'coiling over' – to borrow an evocative phrase from Merleau-Ponty – perceivers become one with what they perceive.⁴²

This idea of coiling over is relevant to the idea of feedback of time and place in a metaphysical framework and, as philosopher Merleau-Ponty suggests, the agency of looking creates an enclosed spatial loop, not dissimilar to the structuralists' graph.

In summary, Tim Ingold's loop, the Ouroboros, the structuralists' graph, and time, all exist as examples of looped, regenerative systems. I would like to place Nakamarra's practice alongside Dashper's "idea of minimalism" as examples of conceptually complex methodologies, that relate to a concept of non-linear time with formalist qualities that are rendered through a reductionist lens. In Chapter 3 these same specific concepts will be applied to theories utilised in the realm of quantum science.

⁴¹ Fuge, "Time travel and tipping points," 184.

⁴² Tim Ingold, *The Life of Lines* (Oxon UK and New York, USA: Routledge, 2015). 99.

Blue Highway

As mentioned, my lasting impression of first seeing Nakamarra's work at *Documenta (13)* resonates with the formal structure of works from the *Blue Highway* series and the viewing experience of these optically challenging works plays on perceptual shifts and schisms. Eigenstate waves of thin colour jumping as real or imagined lines.

In August 2022, through the invitation of Gallery9 director Allan Cooley, the exhibition *Blue Highway* was shown in Darlinghurst, Sydney. The works exhibited included three large paintings from the *Blue Highway* series and several small oil paintings on linen, that relate to Vedral's concept of quantum mutual information, discussed in Chapter 3. These small works were arranged in multiple assemblages, essentially stacks with parts or most of the work concealed.

The *Blue Highway* series has been ongoing since 2015 and is comprised of paintings containing lenticular shapes that are derived from an oval form that can be interpreted equally as an oblique circle, the numeral zero, a sideways letter 'O', a bodily part, a toro, an Ouroboros or an elliptical shape. Ideally these works resonate with Dashper's "idea of minimalism" where concepts relating space-time and agency are condensed, then reconfigured.

The elliptical shape is constructed in a Euclidean method by using two pivot points and a looped string. The pivots are placed on a horizontal axis, and the loop placed over both. A pencil inside the loop forms the third point of a triangle, essentially, and the shape can be drawn by moving the pencil evenly within the looped string. This ancient, conceptually brilliant system of constructing a shape was discovered by Menaechmus, a Greek philosopher, mathematician and geometer who lived in the 4th century BCE.

The selection of *Blue Highway* paintings shown in Gallery9 feature line fundamentally as a unifying element. Within the boundary of each ellipse are undulating lines in the form of shear waves where equal forces act in opposite directions within the arc of curves. Consider particle oscillations within the study of physics; light and sound as waves of colour that meander along a grid in a composition that disrupts the appearance of the surface plane. Folds in the canvas swell as visual torque, from within the confines of an elliptical form, rendered by coloured lines that alternately break rank and leap into the foreground as a non-veridical viewing experience. Pop.



Figure 21. Helen Smith, *Blue Highway #51*, 2022. Oil on linen, 137 x 213 cm. Gallery9 exhibition, 2022.

Lines that not only interrogate the flatness of the canvas but offer the viewer a pulse of quasi-rhythms. This technique, of using curved lines within an ellipse, evokes an optical invariant experience that gives the perception of a shape at a slant, an ambiguity of the oval form.

The title *Blue Highway* is in fact the name of a type of Microsoft font and the concrete poetic-ness (as in concrete poetry) of the words are what appealed initially as a title. Imagine a colour, a road, a conduit to another place and/or time, possibly tinged with a degree of optimism, open ended journey... take from the name whatever you like and equally interpret the paintings in the same way. From a gestalt perspective, the balanced figure-ground relationships in the paintings often create multi-stability, much like a curtain that shifts between two alternatives. The gestalt principle of reification is evident as the perceived lines contain more explicit spatial information than the lines that surround them. A negative space between, facilitates a place for illusionary contours to settle as a non-veridical experience. What is real and what is perceived Krauss stated, "What I'd like to broach here is the issue of a rhythm, or beat, or pulse—a kind of throb of on/off on/off on/off on/off—which, in itself, acts against the stability of visual space in a way that is destructive and devolutionary."⁴³

Essentially the works describe form and line and materialise from an interest in the physics of nature and perception. They could fit within the concept of an integrated existence, as Barad discusses, where things are interconnected.

⁴³ Rosalind Krauss, "The Impulse to See," in *Vision and Visuality: Discussions in Contemporary Culture*, Dia art Foundation, ed. Hal Foster (Seattle, Washington: Bay press, 1988). 51.

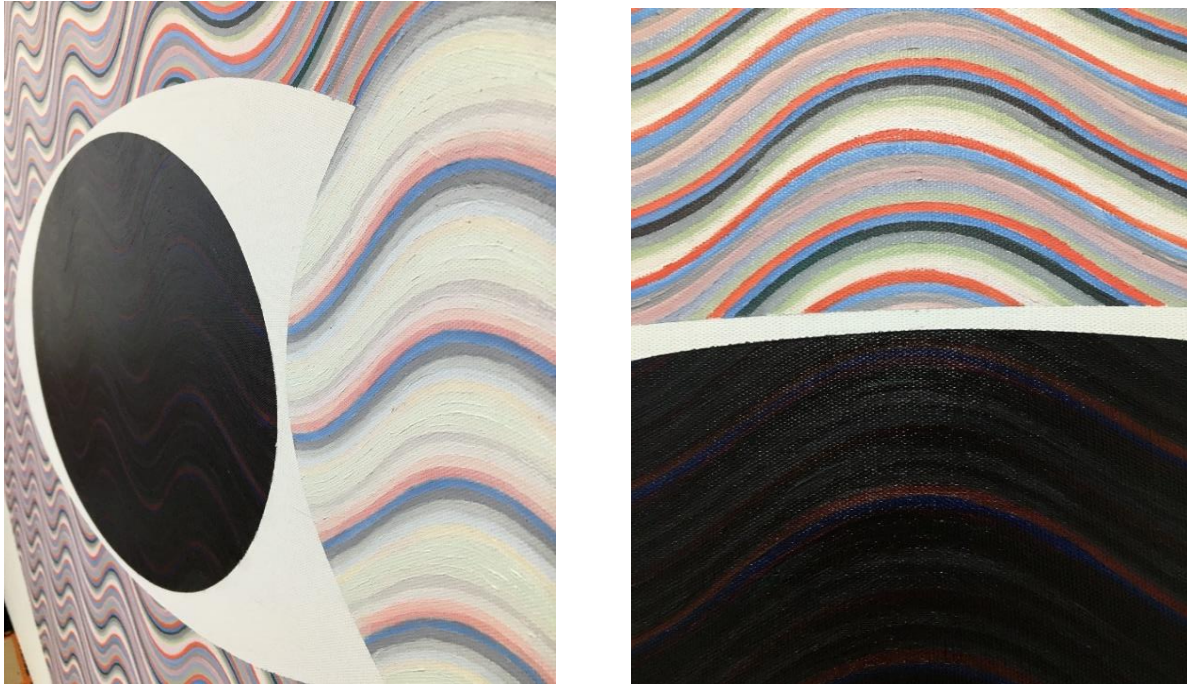


Figure 22 and Figure 23. Helen Smith, *Blue Highway #51*, 2022. Oil on linen, 137 x 213 cm. Gallery9 exhibition, 2022. Detail views.

A Science of Visual Perception and Illusion

As visual perception is pertinent to our interpretation of both quantum physics and art, it is salient to discuss briefly the science behind the phenomenon of illusion. It relates to how we see or perceive the world and importantly it relates to how we perceive particle matter in the quantum realm. James. J. Gibson's (1904-1979) extensive research into optical effects is both relevant and fascinating. Foremost he proposed that, "many or most of the properties of the perceived world are evoked directly by variables of stimulation that the sensory system receives from normal ecology."⁴⁴

To understand Gibson's research, it is useful to isolate some definitions that apply to viewing experiences.

Veridical (meaning truthful) perception refers to perceiving what one sees to be real.

Non-veridical implies an illusional response.

Non-stimulus coupling occurs when perceived size and perceived distance are observed as reversible. The stimulus (S) remains the same and the responses (S_1' , S_2') change (that is, the stimuli are ambiguous and reversible).⁴⁵

Enrichment is defined as an imaginative analysis of what is seen relative to our understanding of the world; this is what stimulates non-veridical experience, the illusion.

⁴⁴ Julian Hochberg, "Higher-Order Stimuli and Inter-Response Coupling in the Perception of the Visual World," in *Perception Essays in Honor of James J. Gibson*, ed. Herbert L. Pick Jr. Robert B. MacLeod (Ithaca and London: Cornell University Press, 1974). 17.

⁴⁵ Hochberg, "Higher-Order Stimuli." 29.

Julian Hochberg (1923 – 2022) was an American psychologist who worked with Gibson's theories, relative to how we perceive the world (and art). "This is a very powerful principle. It explains why we see the world correctly" and, "it explains why we see the world incorrectly, in those cases (the 'illusions') in which the proximal stimulus elicits a perceptual 'habit'."⁴⁶ So basically Hochberg is stating that our understanding of the size and distance in the world is relative to what we consider to be "normal".

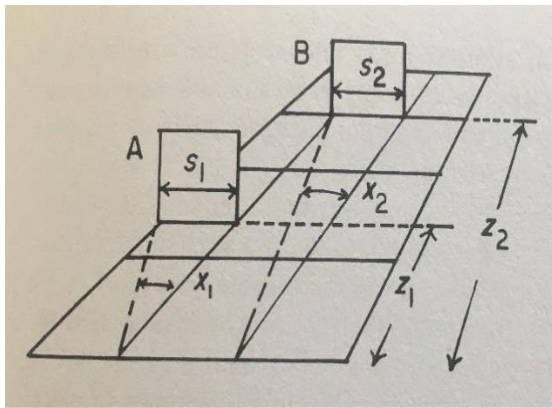


Figure 24. Julian Hochberg, Size, distance, and texture-density gradient. Helmholtz From Julian Hochberg, *The Perceptual World*. A or B signify the object, (s_1 , s_2) refer to the objects' distal size, and (z_1 , z_2) refer to the proximal distance. (Left).

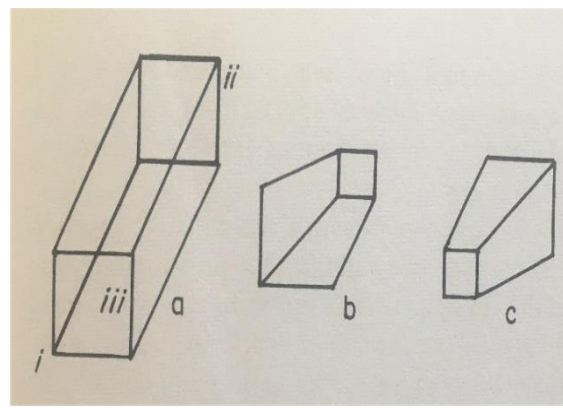


Figure 25. James J. Gibson's simplified graphic of factors contributing to visual perception. (Right).

The artworks from the *Blue Highway* series display traits that are not recognised in the natural world so generally result in a non-veridical experience of seeing. The mind cannot quite decipher an order for what it sees and constructs/imagines a logic to make the experience fit to the real, and a non-stimulus coupling can be made as geometric forms flip and slide. They seem to be clear-cut instances of "enrichment" of "mental process."⁴⁷ The cognitive gaps between what is seen and what is perceived materialises as an imagined experience. Essentially, the nonreferential formalist aspects of these works widen the scope of possibilities for imaginative resolutions by the viewer and the "privacy" of perception. Gibson in conversation with Henle identifies that, "for each of us the perception is private: no one else can share it."⁴⁸

⁴⁶ Hochberg, "Higher-Order Stimuli." 29.

⁴⁷ Hochberg, "Higher-Order Stimuli." 28.

⁴⁸ Hochberg, "Higher-Order Stimuli." 43.



Figure 26. Helen Smith, *Blue Highway #53*, 2022. Oil on linen, 137 x 213 cm. Gallery9 exhibition 2022.

Oscillating lines in the works are borrowed from a myriad of forces in the natural world: from light and sound waves to electromagnetic waves and quantum waves. In the case of my paintings, the size of the oscillating lines is proportional to the size of my hand's arc. Graw would argue that the artist's trace is recorded in the work, embodying the detail and time involved in its making as "specific indexicality" containing "labour, life, value and form."⁴⁹ The arc is relative to the hand and the scale is relative to the body, both an index of my labour serving conceptually to realise the works.

Other prominent artists who have engaged this concept of non-veridical perception include British artist Bridget Riley (born 1931). Whist stating that she "never made any use of scientific theory or scientific data"⁵⁰, Riley employs a great depth of visual stimulus in her practice constructed in terms of "plasticity" or how the paintings are visually built. Hard-edged high-contrasting shapes and forms inform her optically active works. She also discusses this idea of "normal" by explaining, "There should, that is to say, be something akin to a sense of recognition within the work, so that the spectator experiences at one and the same time something known and something unknown. I identify with this 'event'."⁵¹

Clearly, Riley welcomes the non-veridical experience and her exploration of this realm is evident in Figures 27 to 29.

⁴⁹ Graw, *Painting Beyond Itself*. 90.

⁵⁰ Bridget Riley, "Perception Is the Medium," in *The Eye's Mind: Bridget Riley Collected Writings 1965-1999*, ed. Robert Kudielka (London: Thames & Hudson, Serpentine Gallery, De Montford University, 1965).

⁵¹ Riley, "Perception Is the Medium."



Figure 27. Bridget Riley, *Arrest 3*, 1965. Emulsion on canvas, 175 x 192cm. The Glasgow Museums and Galleries, Kelvingrove.



Figure 28. Bridget Riley, *Blaze 1*, 1962. Emulsion on board, 109 x 109cm. Private collection.

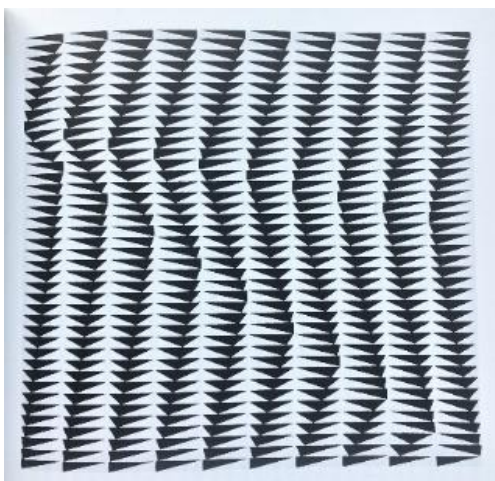


Figure 29. Bridget Riley, *Shift*, 1963. Emulsion on board, 76.2 x 76.2cm. Private collection.



Figure 30. Helen Smith, *Blue Highway #52*, 2022. Oil on linen, 153 x153 cm. Gallery9 exhibition, 2022.

The conceptual premise of the *Blue Highway* series suggests that either way, up or down, as an orientation of the works in the horizontal format, is fine. The lines are close, almost fused with variation in colour and tone, a collective or totality that moves simultaneously in the same direction, their common fate adding to the sense that they are synergistic or a unit. This kinetic patterning and experience might continue to other senses. Think of electrons gliding in space, or photons navigating gravitational forces in their collectively relentless journey, enroute to the next oblique plane: chlorophyll in a plant leaf, reflective surface, abrupt edge, minute crevice, curve of the stratosphere or a crepuscular sky – ultimately to illuminate.

Consider a lacuna, the space between things and the space between lines in paintings: the buffer or gap can serve as a refuge for apparitions, non-veridical experiences that momentarily dwell in these places before jumping to another as the gaze shifts. The surface of the lined paintings is activated with a chimera of real and imagined lines. This phenomenon is relative to Krauss's discussions on the structuralists' graph to post-structuralist ends; she uses the graph to destabilise formalist readings of artworks. A pulse or a rhythm between opposing modes of thought, real and imagined, evoke a pulse, sexual at times, that shifts and is contained only by a state of equilibrium between two points—like the rise and fall of a breath.



Figure 31. Helen Smith, *Old Skirt*, 2023. Fabric on stretcher, 20 x 40cm, diptych.

CHAPTER 3 **Working Concepts Relating to the Theory of Quantum Mutual Information as an “inference indicator”**

Information itself appears in many different guises in the social context: connections between individuals, actions, and states of individuals, capacity of societies to process data and so on. All these types of information play a role in the functioning society.⁵²

– Vlatko Vedral

In Chapter 2, a study of perception explored how we identify how we interpret the physical world and what shapes our understanding of spatial concepts in reductive art. In Chapter 3, these conceptual methodologies and tropes identified with reductivism in art discussed earlier will be applied to aspects of the study of matter in the quantum realm. Reductionism can be seen as a tool for dealing with the complexities associated with quantum matter and this chapter will present how and why Vedral utilises the theory of quantum mutual information as an effective working methodology for dealing with complexity. As our understanding of quantum physics progresses, will our perception of the world alter? Perhaps Indigenous methodologies will come to the forefront once again as effective ways to interact with, rather than exploit, the environment. This contributes to an interconnected existence as implied by Barad’s expansive theoretical concept of agential realism.

Similarly, Vedral describes the concept of mutual information as a logic that stems from both sociology and the sciences. He observes that this is a very useful concept as it is intended to work on many levels. “A little more formally, the whole presence of mutual information can be phrased as an inference indicator.”⁵³

The Concept of Quantum Mutual Information

The theory of quantum mutual information was developed to understand the machinations of problem solving relative to the quantum in contemporary science, and as a precursor to this discussion it is useful to outline some basic terms and definitions of elements existing in this quantum state; that is, the subatomic nuts and bolts of the universe.

Basically, these are:

electrons small negatively charged particles.

protons positive charged particles.

neutrons particles with no charge.

photons particles with electromagnetic radiation like light and radio waves; any composites of these particles are called quarks.

⁵² Vlatko Vedral, *Decoding Reality: The Universe as Quantum Information* (Oxford University Press, 2012). 93.

⁵³ Vedral, *Decoding Reality*. 94.

In profoundly simple terms, all these particles spin or move quickly relative to an axis, independently of those surrounding particles.

In Vedral's fascinating account *Decoding Reality: The Universe as Quantum Information*, he identifies that matter exists in the macro and the micro quantum states and because of the complexity of the quantum system involving particles, Vedral formulates a proposition, a concept that describes the theory of quantum mutual information. By dividing the universe in two parts, the system comprising of a molecule for example, and the remainder, everything outside of the molecule. The quantum mutual information in this scenario, is the surface area of the molecule.⁵⁴

He goes on to identify that the universe only contains information once it is divided, "the very act of partitioning, dividing, and pigeonholing necessarily increases information, as you cut through any parts that may be correlated."⁵⁵ Paradoxically and succinctly, this working concept unleashes the possibility that, "within this formalism it is entirely possible for the Universe to have zero information content, whereas subsets of the Universe may have some information."⁵⁶

This idea relates to the theory of quantum mutual information where, "quantum mutual information is a form of super-correlation between different objects."⁵⁷ Matter can now be interpreted and understood to a degree due to a concept of measuring commonalities.



Figure 32. Construct of concept taken from *Decoding Reality: The Universe as Quantum Information* by Vlatko Vedral.

The inherent beauty of this concept is that it exists as a theory dealing with essentially one common denominator. This profoundly reduces complexity, whilst providing an uncluttered corridor for studying the complex machinations of quantum matter. Parallels between quantum science and philosophical rationales can be drawn at this point, and this idea can be likened to Emmanuel Kant's

⁵⁴ Vedral, *Decoding Reality*. 180.

⁵⁵ Vedral, *Decoding Reality*. 181.

⁵⁶ Vedral, *Decoding Reality*. 181.

⁵⁷ Vedral, *Decoding Reality*. 180.

theories of properties of boundaries and limits, with limits being, “mere negations that affect a magnitude insofar as it does not possess absolute completeness”⁵⁸ and boundaries as, “always presuppos[ing] a space that is found outside a certain fixed location, and encloses that location.”⁵⁹ This reference to boundaries neatly relates to Vedral’s idea of compartmentalising complex scenarios in researching quantum physics. Kant invests in a philosophy that explains Newtonian scientific and mathematical limits of the time (1783) and allows for the element of the unknown within a framework of the known that is contextualised years later in Lacan’s examination of the Imaginary and the Real.⁶⁰

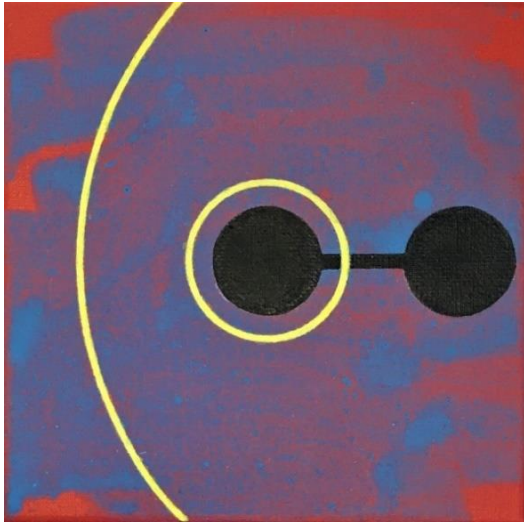


Figure 33. Helen Smith, *Untitled #1 (In Common)*, 2022. Oil on linen, 20 x 20cm. Gallery9 exhibition, 2022.

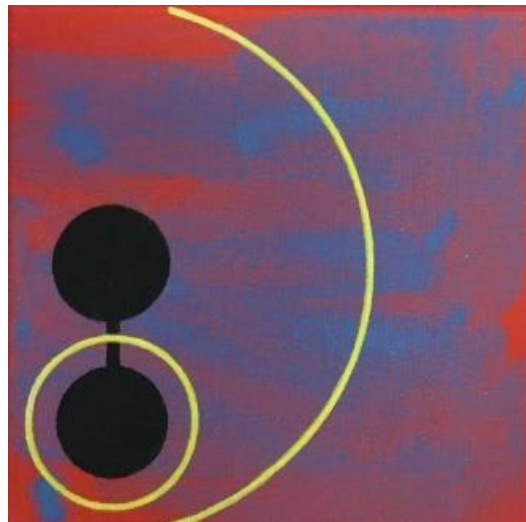


Figure 34. Helen Smith, *Untitled #2 (In Common)*, 2022. Oil on linen, 20 x 20cm. Gallery9 exhibition, 2022.

The concept of partitioning and pigeon-holing, or compartmentalisation to create information also mirrors the methodology of the structuralist graph as a form of enrichment. Whilst the structuralists’ graph has four philosophical compartments, the concept of quantum mutual information prescribes two divisions. This reductive quality is useful when dealing with the complex states of quantum matter, and perhaps this rationale can be related to Dashper’s “idea of minimalism” where a method involves extracting the essence from a convoluted system. In Dashper’s case they are ideas relative to sociology in artistic terms, and Vedral is researching and observing super correlations of quantum matter in a physical sense – “it can only be referred to as a joint property, i.e., a quantum correlation between objects”⁶¹ – the specific particle characteristics of a spin-up, spin-down action. Vedral goes on to identify that, “now we have all the pieces to derive gravity from this logic.”⁶² Once again it is the inherent beauty of this concept that is so tantalising.

⁵⁸ Immanuel Kant, *Prolegomena to Any Future Metaphysics* (Cambridge: Cambridge University Press, 2004 [1783]). 103.

⁵⁹ Kant, *Prolegomena to Any Future Metaphysics*. 104.

⁶⁰ Tom Evers, *Lacan and the Concept of the 'Real'* (175 Fifth Ave, New York Palgrave Macmillian, 2012). 66.

⁶¹ Vedral, *Decoding Reality*. 180.

⁶² Vedral, *Decoding Reality*. 183.

By acknowledging the beauty of Vedral's conceptual theory, a number of works were conceived and one example of the quantum mutual information concept informing artworks is evident in the empirical paintings from the *World Happiness* series. The World Happiness Report sanctioned annually by the United Nations is an example of an inference indicator in the social sector as vast amounts of information are gathered, collated, and reduced into groupings. As the title of the report suggests it is a ranking of the "happiest" countries that score highest on data relating to unemployment, welfare, sustainability, economic status and mental health.

The World Happiness Report is essentially a list sanctioned under the auspice of the United Nations. It involves data from 147 countries or states that exist in the 197 included in the United Nations. It was initiated in 2011 and delivers a published account annually in late May. My paintings of the same title are conceived as a perverse attraction to the idea of ranking happiness through a coding system devised to signify a published list of countries. I am not entirely convinced the UN report could be an accurate account of global happiness and suggest the paintings are a form of satire, which can be exhibited both up or upside down, depending on either a *World Happiness Report* or *World (Un)happiness Report* outcome.

Formally as paintings, the list of countries and the appropriately mixed colour determines each work. The yearly list of ranked nations is presented as a series of lines each noting a national flag. These flags are reduced to a muddy mix of primary colours, appearing together in quantities proportional to flag designs. For example, Finland, ranking first for 2022 and 2023, appears as an undulating pale blue line, and Afghanistan ranked last in both years (the last line on the right), shown as a mixture of black, red, and green with a proportionately small amount of white in a painted line.



Figure 35. Helen Smith, *World Happiness Report, 2022*, 2022. Oil on canvas, 153 x 153 cm.

The Islamic Emirate of Afghanistan “charge” (flag) is now black text on a white background, but the UN still includes the old flag in their sanctioned list, and Palestine is still not recognised as a country by the United Nations, although included in the list.

This colour coding idea stems from viewing the work of Art Povera advocate Alighiero e Boetti who lived predominantly in Italy from 1940-1994. A retrospective exhibition of Boetti’s work titled *Alighiero e Boetti: Game Plan*, was exhibited at the Tate Modern in 2012 and featured a series of works from the *Mappa* series of embroidered rugs created by Afghani women between 1971 and 1994. His writings and interest in social contexts are significant when identifying comparisons between vast amounts of material or data and minimalism. His visual language speaks volumes about the socio-political dynamics of the day. Binary shifts of order, disorder and issues of harmony were concerns that interested Boetti, as art historian and curator Jean-Christophe Ammann concludes: “If Johns’ World maps (MoMA, Ludwig Collection) address the fact that the form and content of a sign, or symbol, remain identical to themselves on any level of abstraction, then Boetti’s

world map assumes importance in terms of the limits and the content of that form, which is human society.”⁶³ It is an inference indicator.



Figure 36. Alighiero e Boetti, *Alighiero e Boetti: Game Plan*, Tate Modern exhibition, 2012. Installation view. Photo, Helen Smith. Page from the *World Happiness Report*, Annual Report, 2022.

The bundling of counties in a convivial order, as in the UN's World Happiness Report, borders on the absurd, though one would hope there is ultimately some merit to humanity in this competition for contentedness. In the suite of *World Happiness Report* paintings this incredibly complex account of human interactions is reduced to line and colour.

The *World (Un)happiness Report*, 2022, is shown as Figure 37, and you would be correct in guessing that this is the same painting inverted, as in fact it is. By adhering to logic of the structuralists' graph, the concept (being hermetic) can equally be appreciated by viewing the painting in either direction. As prescribed by the structuralists' graph, it is the language (only the prefix) that needs adjusting or the grid and the ground reversed. So, why not paint new work? The answer lies in the action of intervention. By simply inverting the work it becomes new, only through the agency of the viewer perceiving the shift in orientation. This action mirrors the working methods of both Dashper and Nakamarra whose artworks can readily be inverted, the static picture plane becoming active in an action of transitivity. Similarly, in accordance with Dashper and Nakamarra's works the paintings are fundamentally complex in content material, while appearing in formal terms to be comparatively minimal. Conceptually it is the mutual information gathered that dictates the outcome.

⁶³ Jean-Christophe Ammann, *Alighiero e Boetti*, Exhibition Catalogue, ed. Kunstmuseum Lucern (1974).



Figure 37. Helen Smith, *World (Un)happiness Report, 2022*, 2022. Oil on canvas, 153 x 153cm.



Figure 38. Helen Smith, *Assemblage #4*, 2022. Oil on linen, diptych 40.5 x 76 x 4cm. Gallery9 exhibition, 2022.

The series of smaller assembled artworks also shown at Gallery9 play with visual mechanisms. The works are static, but they imply movement, only because of our experience of “normal” as discussed early in the section referencing perception. In the hallmarks of minimalism, formal aspects of shape and form are reduced to critical features and sections of mutual information are highlighted in these works. The premise is that the work is self-referential, and the circular form originates from the idea of filling the rectangular canvas with a round form, as a point of difference. In the concept of squaring the circle, as referenced by Duchamp, the supporting framework acts essentially as a container for the form, with movement implicated by compositional elements. The resulting composition relates to our experience of physical forces felt in the natural world, as kinetic movement is suggested. The work appeals to our perceptions of the physical world and speaks of transitivity.

The Theory of Quantum Entanglement

The movement on subatomic particles is beguiling, but research incorporating the use of a crystal beam splitter has shown that it is possible for two particles to be directly related to each other through shared “information”. As Vedral states, this is their quantum mutual information. Two particles may correlate completely with each other simultaneously, even though the distance between them may be vast. Einstein was the first to identify this phenomenon and called it “spooky action at a distance”⁶⁴ and today it is recognised as quantum entanglement. Consider this on a universal scale, in cosmic terms the behaviour of matter at the macroscopic and subatomic is always the same, importantly the quantum addresses both systems. Vedral identifies that activity of matter

⁶⁴ Vedral, *Decoding Reality*. 129.

in quantum physics, “applies to all matter in the Universe.”⁶⁵ He also discusses his research involving states of entanglement and identifies that this phenomenon has to do with a form of communication “information” between the particles relating basically to a particle spin-up or a particle spin-down scenario.

$$|\uparrow_z\rangle = (1,0)$$

$$|\downarrow_z\rangle = (0,1)$$

Figure 39. Spin-up, Spin-down formula for quantum particles.
Quantum Ontology. A Guide to the Metaphysics of Quantum Mechanics.

In the state of quantum entanglement these spins, operating on a ‘z’ axis, are intrinsically connected rather than operating independently or by their own volition. Other speculative ideas suggest that it is possible for entangled particles to both spin-up and spin-down simultaneously. As physicist John Bell’s Theorem dictates, “the measurement on each particle yields *both* a spin-up outcome and a spin-down outcome, in two distinct branches of reality.”⁶⁶

Fascinated by this feature of the quantum realm, I composed a series of paired artworks using this logic, the logic of shared mutual information. Artworks of oil on canvas and glass assemblages, presented minimal, formalist informational coding to correspond to the spin-up spin-down state. The information is described through materiality, transparent glass and opaque paint juxtaposed as material opposites, formulating a visual dialogue existing between each pair.

The “inference indicator” as Vedral explains, denotes the edge where information is shared, it’s common to both components and it is this feature that has informed the small works titled *In Common*.

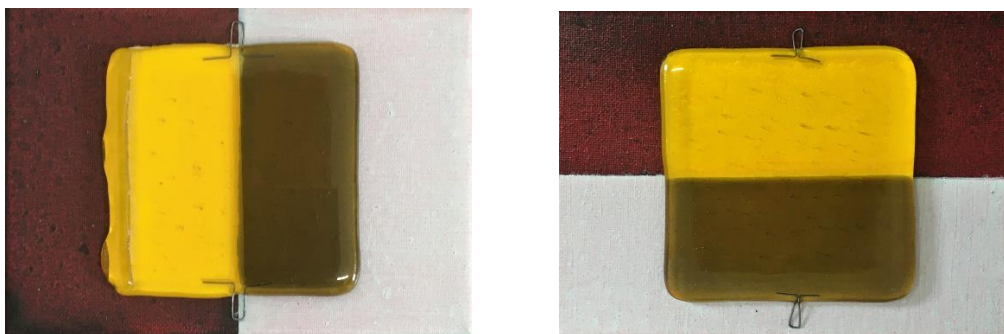


Figure 40. Helen Smith, *In common, 2023 #1*, 2023. Kilned glass, oil paint and canvas, assemblage, 13 x 39cm, diptych.

⁶⁵ Vedral, *Decoding Reality*. 132.

⁶⁶Peter J. Lewis, *Quantum Ontology. A Guide to the Metaphysics of Quantum Mechanics* (New York, NY: Oxford University Press, 2016). 10.

Perhaps these works emulate multiple worlds, pairings that speak of temporal and spatial concepts as science challenges our concept of “normal” and Euclidean perceptions of the world. Painted canvas, coloured glass and found photo assemblages are the substrate for these small works that encapsulate another time and juxtapose materiality. Complex and minimal, they describe an imagined world adhering to the logic of the Structuralist graph. A spin-up, spin-down split of hermetic formalism that invites close contemplation through a tinted lens.

H. Everett postulates that in the “many worlds” theory the word “world” can also relate to the physical spin-up, spin-down properties of a single electron or particle. A “superposition.”⁶⁷

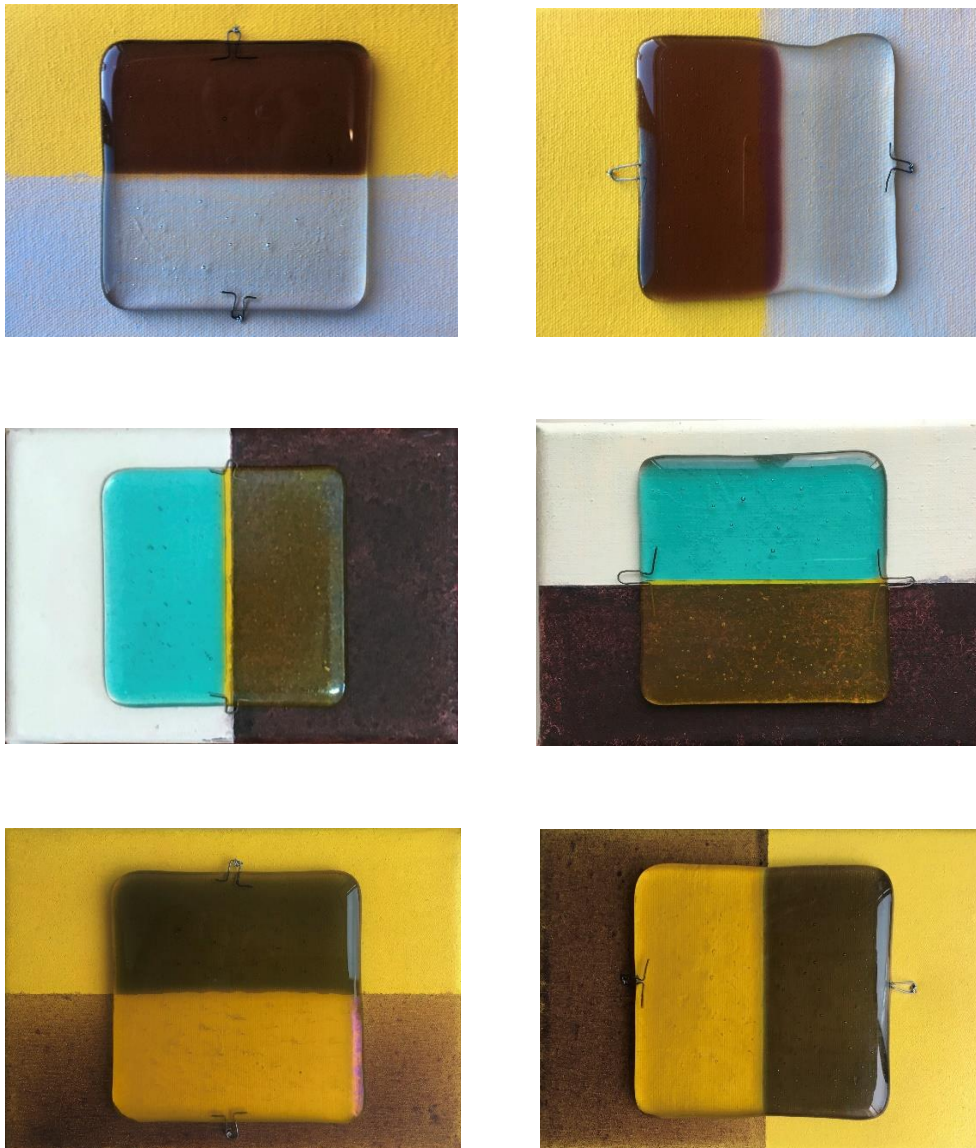


Figure 41 to Figure 43. Helen Smith, *In common, 2023 #2 - #4, 2023*. Kilned glass, oil paint and canvas assemblages, 13 x 39cm, each diptych.

⁶⁷ Lewis, *Quantum Ontology* . 10.



Figure 44. Helen Smith, *In common 2023#11*, 2023. Kilned glass, oil paint, canvas and found photo assemblages, 12.5 x 18cm. (Left).

Figure 45. Helen Smith, *In common 2023#12*, 2023. Kilned glass, oil paint, canvas and found photo assemblages, 12.5 x 18cm. Single works. (Right).

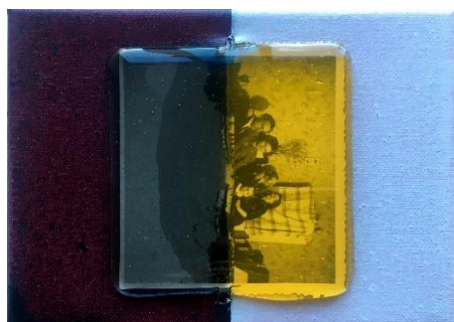


Figure 46. Helen Smith, *In common 2023#5*, 2023. Kilned glass, oil paint, canvas, found photo assemblages, 12.5 x 39cm, each diptych (above).

Figure 47. Helen Smith, *In common 2023#6*, 2023. Kilned glass, oil paint, canvas, found photo assemblages, 12.5 x 39cm, each diptych (below).

Behavioural encryption exists in all matter in the universe as particles of electrical charges. As Vedral goes on to explain, it is, “a relational property of the object in connection with the rest of the Universe.”⁶⁸ This theory of entanglement is simultaneously minimal and complex, as it is basically not possible in classical physics and defines a major difference between the two areas of study, namely physics and quantum physics.⁶⁹ Barad’s philosophical take on this phenomena states that, “To be entangled is not simply to be intertwined with another, as in the joining of separate entities, but to lack an independent, self-contained existence. Existence is not an individual affair.”⁷⁰ By using this logic as a departure point for making art, perhaps the constraints of time and space can be subverted as was evident in the work of Doreen Reid Nakamarra. Entanglement can be seen as a universal or anthropic logic of connectedness.

Like entanglement, the theory of quantum mutual information allows science to identify phenomena like interconnectedness. If we concede that this is a tremendous amount of information to be dealing with in the science, the methodology of reduction as defined by this theory is extraordinary and by the compression of information, Vedral implies that we can gain a greater understanding of the universe. It is essential to differentiate between understanding the intricate details of quantum mechanics, which should be left up to the experts in the field, and even within this field of research the levels of academic conjecture regarding quantum propositions are high. Once experimental conditions are established the quantum system immediately collapses and so experimentation is difficult. It’s the theoretical concept that is of interest in this thesis and how a concept can be possibly visualised through art as a strategy for dealing ultimately with universal complexity.

⁶⁸ Vedral, *Decoding Reality*. 181.

⁶⁹ Vedral, *Decoding Reality*. 181.

⁷⁰ Barad, *Meeting the Universe Halfway*. Preface, Kindle file.

PI (Pink Intervention) 2022 and 2023

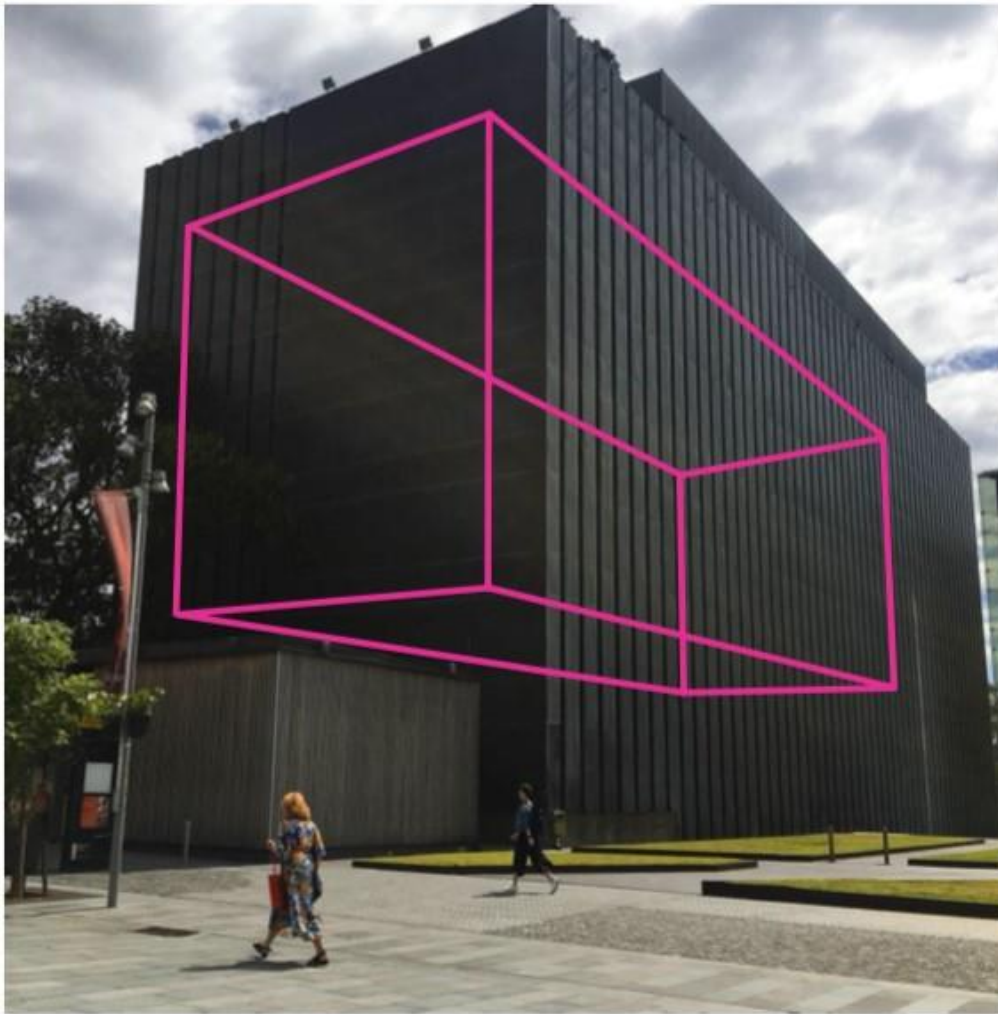


Figure 48. Helen Smith, *PI 2022, The University of Sydney*, 2022. Acrylic on paper, arbitrary texts and library building, assemblage, 13m x 24m x 12.5m. University of Sydney Campus. Installation view of concealed work.

In December 2022, the concept of partitioning relative to mutual information was utilised as a departure point for an artwork with measurements set by the architecture of the Fisher Library at The University of Sydney. The building (notably one of my favourites on campus) housing a myriad of texts was selected as the supporting structure for the work. Co-ordinates relative to appropriate “hanging devices” (in this case, books on shelves) were identified and the “pink intervention” — a painted slip of paper, installed during a clandestine operation.

Eight corner points of a cuboid shape were identified within the library and pink painted paper was inserted loosely in each of the textbooks. Perhaps these texts will remain shelved in position or possibly the books are borrowed and taken home, in which case the shape distorts accordingly. The work exists as a departure point for an unknown shape, and as the various books are borrowed the cuboid shape will assume a plasticity. The intervention could be seen as a form of expanded painting, the painting not on a stretcher but occupying an ulterior space.⁷¹

⁷¹Graw, "The Value of Liveliness." 89.

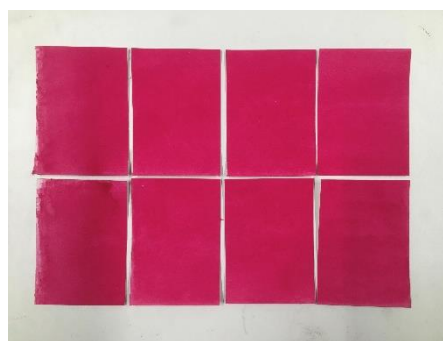


Figure 49 and Figure 50. Helen Smith, *PI 2022, The University of Sydney*, 2022. (Details) Pink painted paper components back and front view.

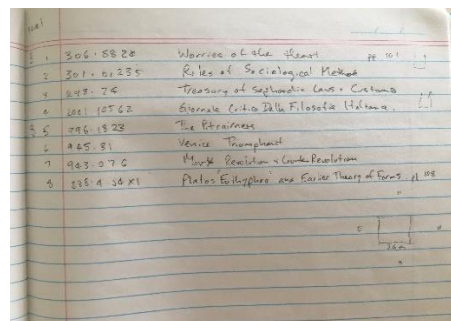
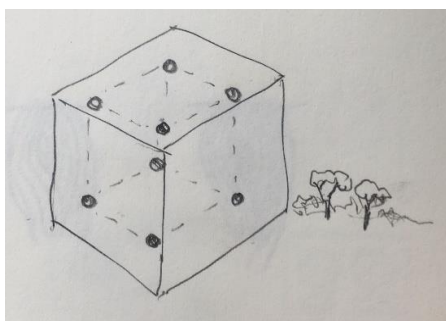


Figure 51 and Figure 52. Helen Smith, *PI 2022, The University of Sydney*, 2022. Schema sketch of cuboid shape. Co-ordinates of books defining the cuboid structure relative to Dewey Decimal System.

The many shape variations will never be known, along with the duration of the work, but as the “laws” of the library dictate the original cuboid shape will expand and contract as reminders are issued to return books. The Fisher Library is the system. It is possible that reconfiguration resides in agency of activity, specifically library visitors. The substrate of the building contains the work that occupies a quasi-latent space, where structural forces that result in change exist as an endless combination of permutations or mutations as dictated by library activity. The artwork talks to the laws of the quantum.⁷² It is a conceptual premise of the common denominator that can be posited amongst the theoretical physicist David Bohm’s idea of Implicate Order, which considers the “self-ordering qualities of the Universe.”⁷³ Bohm’s conclusion is, “that in certain key ways the activity of information at the quantum level is similar to the activity of information in ordinary human subjective experience.”⁷⁴

The information in this instance relative to the mutual information is the scaffolding for the concept of this work, contained in a building (rather than an electron) and the formal appearance of the shape is informed by activity or as Barad describes as agential realism where humans and non-humans “intra-act”. Agency as a relationship.⁷⁵

⁷² Robert Temple, *A New Science of Heaven* (London, United Kingdom: Hodder & Stoughton, 2022). 294.

⁷³ Temple, *A New Science of Heaven*. 294.

⁷⁴ Temple, *A New Science of Heaven*. 294.

⁷⁵ Barad, *Meeting the Universe Halfway*. Chap.4, Kindle file.

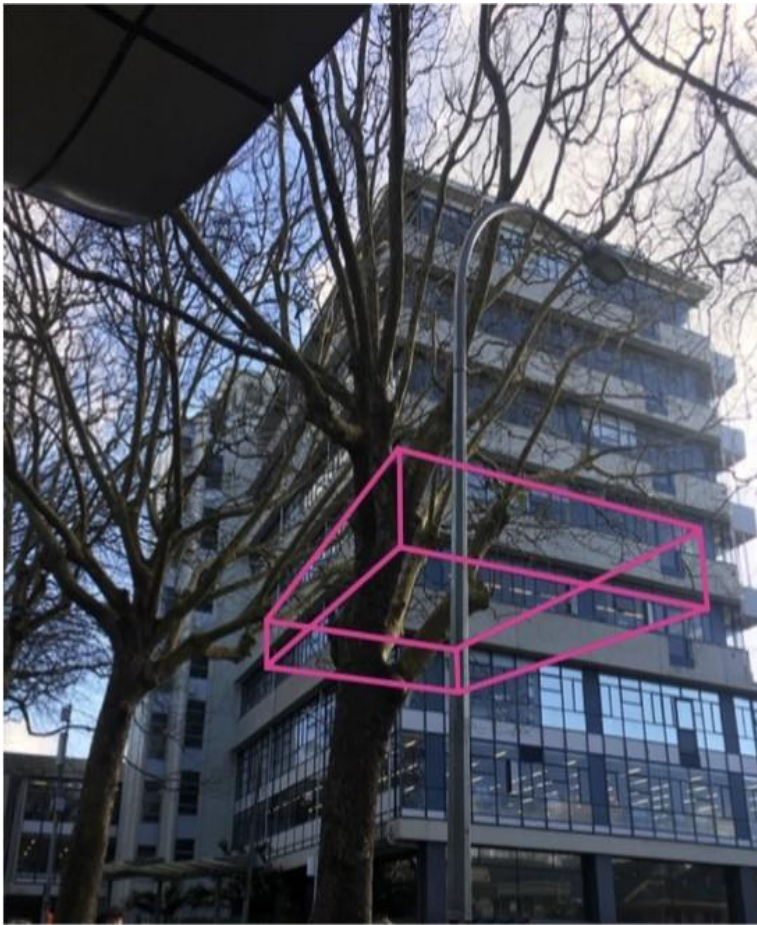


Figure 53. Helen Smith, *PI 2023, The University of Auckland*, 2023. Acrylic on paper, arbitrary texts and library building, assemblage, 13m x 24m x 12.5m. The University of Auckland Campus. Installation view of concealed work.

Think back to Dashper's "idea of minimalism" and similarly Vedral's quantum mutual information theory as methods of diffraction. In 2023, a Fauvette Loureiro Travel Scholarship facilitated a trip to Auckland. Whilst this was used principally to research the work of Julian Dashper, it also provided the opportunity to replicate the *PI 2022, The University of Sydney* installation with a paired cuboid shape installed within the library building on The University of Auckland campus, and so a network of interrelated, clandestine, sculptures are invigilated, connecting integral locations in this paper.

If the scale is stepped up a little, we can consider coordinates on a planetary scale by locating coordinates mapped in an Antipodean method. Perhaps the concept of a worm hole as a hypothetical structure connecting disparate points in space time comes to mind; a lacuna, a gap or the space between things and distances again considered.⁷⁶

⁷⁶ Dr Barry Parker, *Cosmic Time Travel: A Scientific Odyssey* (New York and London: Plenum Press, 1991). 8.

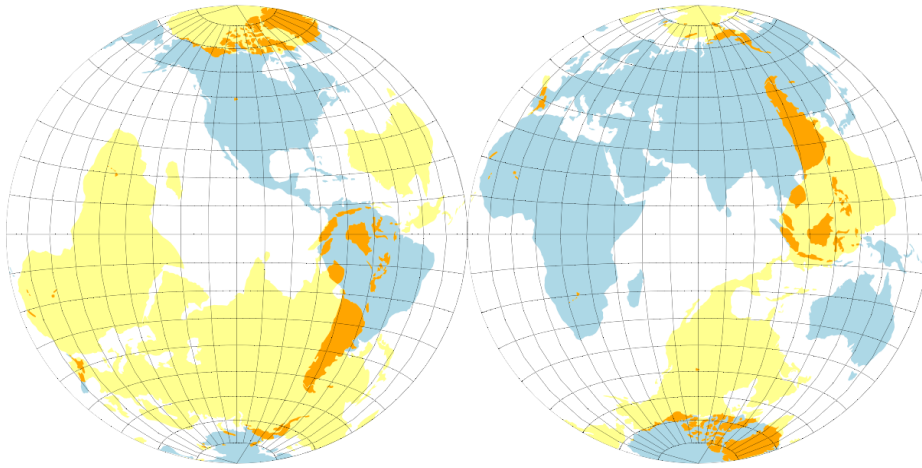


Figure 54. Antipodean Map indicating the opposite geographic locations of the World.

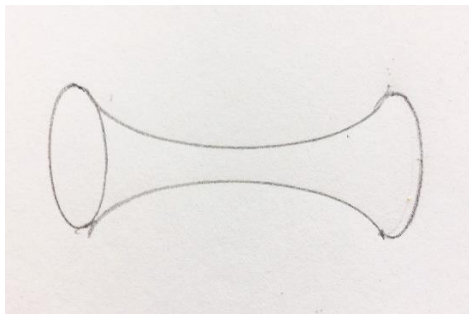


Figure 55. A sketch of a worm hole in space.
Reference *Cosmic Time Travel*, 8.

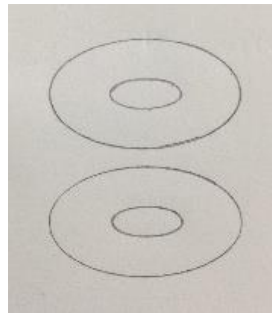


Figure 56. A sketch taken from my visual diary
considering the space between things.

The works made in Kassel and Venice for *The World is Your Studio (After JD)*, were a precursor for the next *Pink Intervention*, 2022 and 2023 works discussed in this thesis. Correspondingly, the concept involved the possibility of a conduit or connecting device between the two places, namely Leipzig and The University of Sydney. It was arranged and in collaboration with fellow student Farnaz Dadfar (who was travelling to Leipzig for a Leipzig International Art Program residency) that two paired works would be installed: one at the Leipzig Spinnerei and the other on campus in Sydney. This project was completed in January of 2023.



Figure 57 and Figure 58. Farnaz Dadfar and Helen Smith, *PI*, 2023, *The Spinnerei*, 2023. Acrylic, wallpaper and paste. In collaboration with Farnaz Dadfar, courtesy of Leipzig International Art Program (LIA). Photo, Farnaz Dadfar.

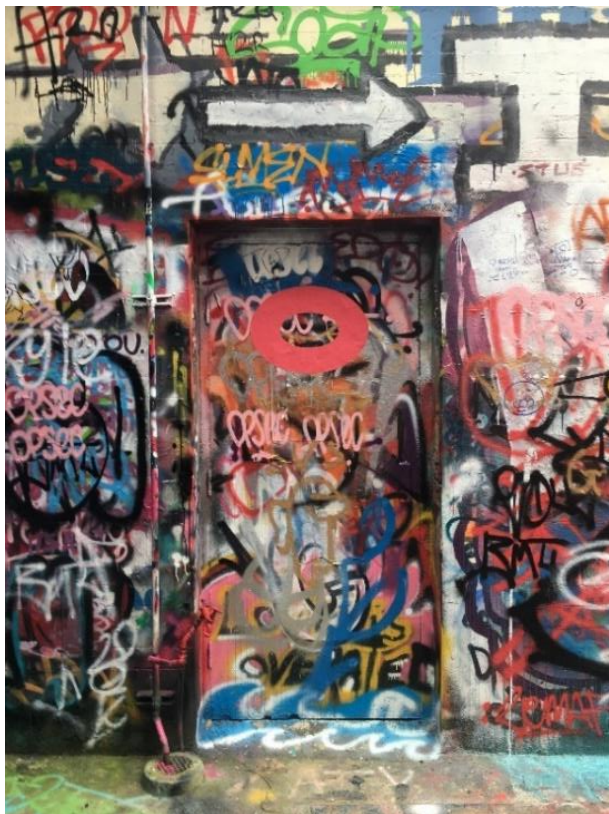


Figure 59. Helen Smith and Farnaz Dadfar, *PI 2023*, *The University of Sydney, (building S104B)*, 2023. Acrylic, wallpaper and paste. In collaboration with Farnaz Dadfar.



Figure 60. Helen Smith and Farnaz Dadfar, *PI 2023*, *The University of Sydney, (building S104B)*, 2023. Acrylic, wallpaper and paste. In collaboration with Farnaz Dadfar.

Time and space. The work speaks of an antipodean, perceptual line that traverses simultaneously around or through the Earth. The artwork exists as a common element, a metaphoric ellipsis (...) a joining of the dots and it also refers to space and distance relative to the concept of mutual information. It is not intended to represent the idea of entanglement but more it demonstrates a conceptualised analogy of how matter behaves in the quantum. A superposition. As Barad describes, the nature of quantum entanglement is, “to produce a new way of thinking about the nature of difference, and of space, time, matter, causality and agency.”⁷⁷

Consider lines that join points on a globe, that curve around the earth as in the *Pink Intervention* 2022 works mentioned earlier, the imagined experience of connecting two places. Each end of these connecting tropes is identified by a painted shape in an urban landscape. The phenomena of entanglement between sub-atomic particles or a connection between a lover who has travelled abroad or a family one yearns for when separated through conflict or financial hardship. The imagined perceptual line has the agency of a conduit of thought, traversing space and time.

How can two things be intrinsically connected and what is the shared information that defines the relationship and what is its effect on the world? Perhaps this relates back to concepts pertaining to the structuralists’ graph or concepts still in play stemming from ancient cultures, such as the ancient culture of the First Australians as identified in Chapter 2. Frameworks that describe life and bloodlines exist as linear connections of generations future, past and present, that also include the land and sky as is evident in Nakamarra’s vivid paintings describing the essence of place through the agency of generations. In 1994 Dashper proposed to access the future using a landline telephone, suggesting that linear time can operate in a loop-like fashion. All these events become possible by deifying current Euclidean and temporal concepts. By acknowledging research in quantum science, it is evident that, “matter tells space-time how to curve, while space-time (when curved) instructs matter how to move.”⁷⁸ The concept of time as space-time is described as a perpetual ellipse, a loop that feeds itself, the Ouroboros.

“Spacetimematterings”: Working Concepts Relating to the Theory of Agential Realism

The exhibition *The World is Your Studio (after JD)* at SCA Project Space (that accompanies this thesis) presents works not in a singular context, but ideally in a connective context and optimally for the viewer, the works pose questions rather than offering answers. These artworks aspire to both an expansive realisation of geographical space and on/off paradigm, the spin-up/spin-down concepts residing in the quantum, each work residing ideally in the gentle premise of Dashper’s “idea of minimalism.” His world, his future resonating in our present, for the moment. The world as a studio, and an experimental space for expanding thought where Vedral’s ideas relative to the quantum mutual information theory assimilate with Dashper’s idea, of identifying multiple factors in an encapsulated rendition.

RBG sits obscurely as a pair in the Sydney College of the Arts Project Space, the large and small in conversation, the hermetic nexus of non-veridical text and a painted experience. As an extension to the paintings on canvas this work was completed as an experimental piece to observe how materiality would affect perception. The line and colour start to jump and flicker from a flat plane, as a viewing experience that is impossible to photograph. By standing in front of both the auroral arcs

⁷⁷ Barad, *Meeting the Universe Halfway*. 73.

⁷⁸ Dr Barry Parker, *Cosmic Time Travel*. 84.

and the text, it is the perception of scale and colour juxtapositions that inform the individual experience of seeing. An illusion.

The objectified painting, quietly in dialogue with the coloured text on the wall and the viewer's non-veridical experience, speaks to the concept of agential realism as a unified experience, as Barad talks of an interconnectedness between nonhuman and human states.⁷⁹ It is intended that the positioning of all works in the exhibition space ideally results in a looped, feedback viewing experience. As with the other painted works in the SCA Project Space, the architecture of the space, the vaulted roof in particular, create a visual vibrato with curved art forms.

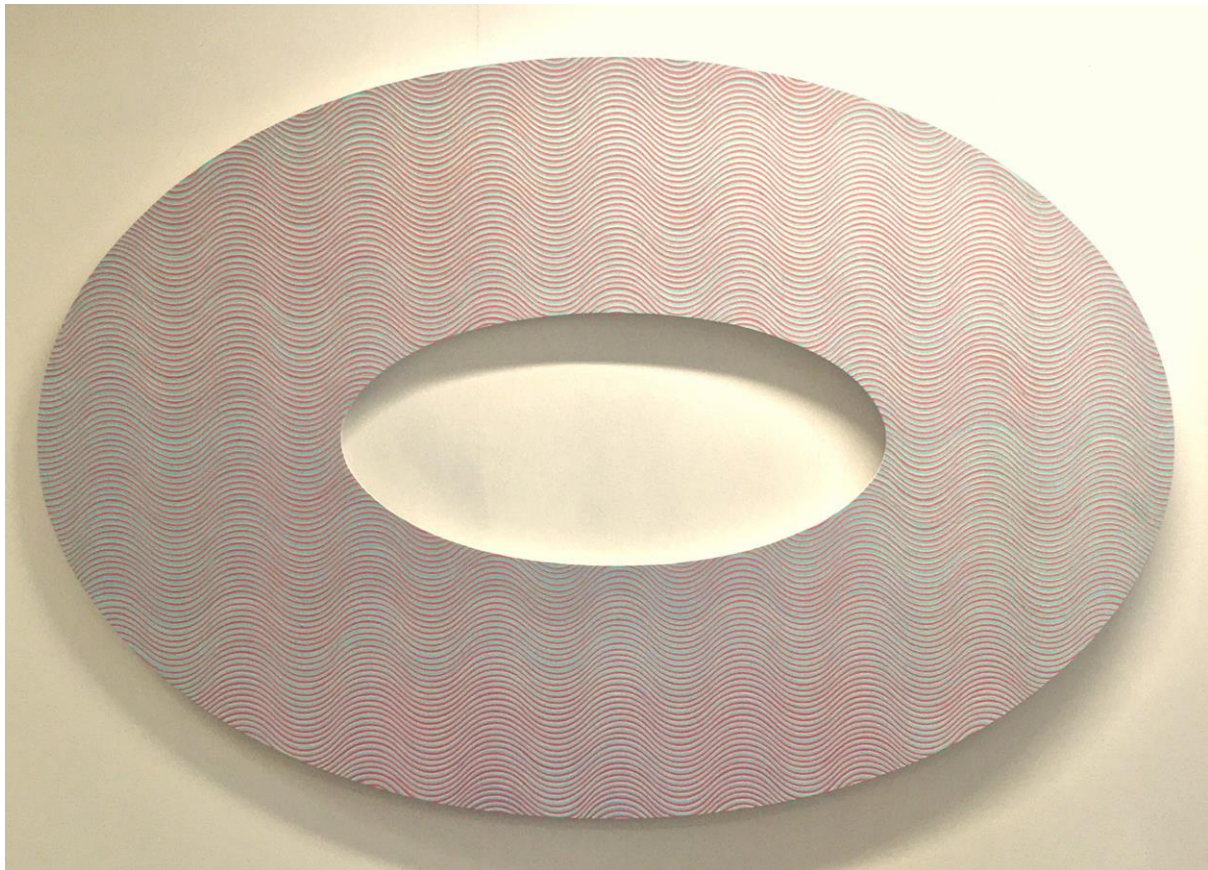


Figure 61. Helen Smith, *RBG*, 2023. Oil on shaped board, 201 x 137 cm, diptych.



Figure 62. Helen Smith, *RBG*, 2023. Painted lettering, 3 x 10cm, diptych.

⁷⁹ Barad, *Meeting the Universe Halfway*: Chap.4, Kindle file.

This temporal loop also applies conceptually to the two years of research and practice condensed into a two-week schedule, or hours of labour seen in a glimpse. Both considerations adhere to Barad's concept of "spacetime-matterings"⁸⁰ where all things human and non-human have agency and operate in a looped system. The exhibition space is inhabited by traces or remnants of transglobal intra-actions where geographical locations are connected by an inference indicator, a pink intervention. Whilst this device or cut out served as the factor in common in both locations, there are a myriad of factors contributing to the project, such as time, distance, political stability, the structure on which it is placed, and the duration of these ephemeral works in an exposed urban landscape. The agency of all these factors is what Barad is describing as agential realism, all working in an interconnected network of intra-action and Barad's theory of agential realism, stemming from her work as a physicist, can equally be applied to an ontological study including both science and philosophy.

The concept of agential realism is by definition all encompassing. Science, philosophy, time, and space are all considered: thinking back to Dashper's exhibition of slide works, Nakamarr's writhing paintings, World Happiness Reports and sculptures located as fixed points in libraries reconfigured by students borrowing books and taking them home or leaving them on a train by chance. Lacan identifies when discussing limits and boundaries that, "one hand mathematical and scientific limits... on the other hand metaphysical boundaries existing on the border between the knowable and the unknowable."⁸¹ I would locate Vedral's theory of quantum mutual information as a mechanism for creating a manageable border to facilitate "knowing" in the midst of highly complex scenarios, whereas agential realism considers and acknowledges everything else as having value in a network of intra-actions — living and non-living, past and present, vast and quantum.

⁸⁰ Barad, *Meeting the Universe Halfway*. Chap.4, Kindle file.

⁸¹ Eysers, Tom. *Lacan and the Concept of the 'Real'*. 175 Fifth Ave, New York Palgrave Macmillan 2012. 66.

CONCLUSION *Future Call* – Julian Dashper

Future Call, Topolo, mid 1994, Italy

So I informed everyone who would listen that I would telephone the exhibition at an appointed time and place from my home in New Zealand on the understanding that the phone would be left to ring. And ring. And ring. That would be my work. If the phone wasn't picked up, I wouldn't be charged anything. I was ringing from the future and it was free. That was part of its beauty. I called it *Future Call* sometime later.⁸²

– Julian Dashper

After unravelling selected artesian concepts through arguments relative to structures of thinking in the contemporary world, we have identified concepts of quantum thinking that disrupt established understandings of time and space. It is apparent, in quantum terms, that time relative to particle speed can be measured, but once theories of entanglement are broached the linear concept of time dissipates as an irrelevant factor. Experimentation with the quantum realm is difficult, and a contentious area of research and many experimental outcomes are impossible to prove beyond doubt scientifically.

Dashper's mischievous play with temporal concepts, and Australian Aboriginal cultural understandings that the past, present and future exist perpetually as one, question a Euclidian concept of time. Dr Barry Parker asks the question: what is time? And goes on to identify that, "Scientists, in particular, will probably admit that they don't really know what it is. To them, it is something they factor into their equations, but find it hard to define."⁸³

As our understanding of scientific machinations of the world shift, do perceptions of what is "normal" slide sideways (or perhaps slip both ways simultaneously) in turn altering established perceptions of the real and what can be imagined? With the advent of artificial intelligence decisions on how we implement new science is to be carefully considered, along with knowledge stored perpetually from peoples in touch with the land where the agential realism of non-human and human are enmeshed. I suggest that past philosophical concepts can be reinterpreted through the charge of the scientific research, and ultimately bare light on quotidian activities and creative practices alike.

The concept of mutual information as Vedral describes, is a useful concept as it is intended to work on many levels as inference indicators in both sociology and science.⁸⁴ I would like to propose that the management of information as per the idea of quantum mutual information, to a reduced set of parameters, is a very useful problem-solving mechanism and can be correlated directly with Dashper's working method, his "idea of minimalism". As philosophical concepts are presented in a graphic form comprised of multiple levels of complexity, both are lateral conceptually and serve as a reductive method of viewing the world.

⁸² Dashper, *This is not writing*. 152.

⁸³ Dr Barry Parker, *Cosmic Time Travel* 87.

⁸⁴ Vedral, *Decoding Reality*. 94.

Finally, the conceptual beauty of Julian Dashper's "idea of minimalism" is simply accommodating social and geographical structures and his generous artistic legacy lives by feeding generations to come. As an artist interested in the machinations of the quantum realm, I can only reiterate the significance of the conceptual thinking, the idea of the concept, the theory as a method of encryption whether it be the theory of quantum mutual information in physics, or a graph used to encode philosophical thought, an "idea of minimalism." All these concepts display a beauty inherent in a reductive concept, particularly in reference to Dashper's exhibition of two hundred original slides and Nakamarr's mnemonic paintings of the folded landscape and time, or the complex list pertaining to the happiness of the World's population, or common elements that exists in First Australian song lines as embodied knowledge, past and future all demonstrating how a tremendous amount of information can be embedded in a minimal visual form. I suggest this indicates a significant correlation between the "idea of minimalism" and the concept of an "inference indicator." As Vedral succinctly observes, "quantum physics suggests that there is no underlying single reality in the Universe independent of us – and that our reality is actually only defined if and when we observe it."⁸⁵

Ideally the contribution of this research to the field of contemporary art lies in its description of how reductive strategies of making can signify the ways in which we can manage the challenges presented by changes to our increasingly precarious existence on this planet. By coupling minimalist concepts with a somewhat fettered fascination for quantum physics, this project acknowledges that together science and philosophy inform our place in the world on a macro and micro scale. We have a shared culture in both fields of study and after all, the subatomic particles of the quantum realm are the building blocks for plants, animals, minerals, stars, the air we breathe and so these small fundamental particles could be interpreted as a common denominator in both humanity and the natural world. It is "mutual information."

⁸⁵ Vedral, *Decoding Reality*. 206.



Figure 63. Julian Dashper, *Future Call*, mid 1994. Performance, Topolo, Italy.

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