# THE FOLD AS A SITE OF TRANSFORMATION

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#### ABSTRACT:

Research into the 'fold' as an emergent site of transformation aims to see both the surface of things and beyond to deeper layers of hidden connections. The following includes 1. Introducing the fold as an ontology, with Levi Bryant's 'The Interior of Things: The Origami of Being'. 2. Illustrating the fold as a radical pedagogy with experimental new approaches. 3. Concluding with the fold as praxis, as a performative model for an innovative artistic practice by combining different trans-disciplinary fields of knowledge and expertise. By using the above framework, I question and explore the fold through material-led artistic research. Critically, this situates what can be termed an 'Observationist' standpoint against a post-modern backdrop of Actor Network Theory, Graham Harman's Object Oriented Ontology, Speculative Realism and Phenomenology.

#### KEY TERMS

Folded Ontology. Observationism. Actor Network Theory. Object Oriented Ontology. Speculative Realism. Phenomenology.

## 1. METHODOLOGY: EXPERIMENTATION

My artistic research explores the fold as a site of transformation. This methodology grew from a series of group discussions during two MFA class modules: Experimentation, and Contexts. To decide on our methods in the experimentation module we discussed ways of bringing different atmospheres and also ourselves as researchers into the project, based on a number of themes and chosen texts. In 'On Intellectual Craftsmanship,' C. Wright Mills advises to "use your life experience in your intellectual work." <sup>1</sup> Irit Rogoff's performance lecture 'Becoming Research' was also influential. Themes included crossings, frictions, markings, struggles and atmospheres that the project attunes to. Some of the key research terms from these sessions were:

- Fold
- Surface
- System
- Theatricality
- Rigid
- Unsayable
- Intimate
- Narrative
- Unfolding
- Experimenting
- Challenge.

To answer the question *What is fold?* - a number of geometrically proven origami axioms put forward by Robert Lang are tested on a randomly squash-folded piece of paper.

on a randomly squash-folded piece of paper. This introduces the inherent geometry of rigid origami and recalls Rogoff's atmosphere of 'becoming research'. To show rather than explain, the fold is explored as a performative radical pedagogy, introducing three complex rigid origami folds; the Miura fold, reverse fold, and water-bomb fold. These examples are used in a mixture of sculptural and video works to explore the following grounding ideas: The vortex as a primal form put forward by Michael Serres and Levi Bryant<sup>2</sup>, the implicate and explicate order of David Bohm<sup>3</sup>, Wittgenstein's Family Resemblances,<sup>4</sup> and the paradox of the möbius surface.

- <sup>3</sup> D. Bohm. Wholeness and the Implicate Order. Routledge & Kegan Paul. London. P. 186 1980.
- <sup>4</sup> L. Wittgenstein. Philosophical Investigations. Macmillan Publishing Company §67. 1953.



Water-bomb tessellated form.

<sup>&</sup>lt;sup>1</sup> C. Wright Mills On Intellectual Craftsmanship, The Sociological Imagination, Oxford University Press. P.4 1959

<sup>&</sup>lt;sup>2</sup>Levi R. Bryant. "The interior of things: The origami of being". Przegląd Kulturoznawczy 3. P.297 2016.

#### 1.1 REVERSE FOLD: HIDDEN MEANING

In the video performance 'Un-folding Realities,' a simply folded sheet of paper is demonstrated to also fold the space around it. Introducing a more complex reverse-fold, two pieces of *identically folded* paper show the idea of hidden information beyond what is obvious. While appearing to be unrelated at first glance, information from each piece of paper is enfolded and hidden within the folds of the other. This explores the idea of a hidden or 'implicate order', that is inaccessible to us and an 'explicate order' that we experience. Physicist David Bohm uses this idea to explain quantum entanglement, when a pair of particles, such as electrons are energised by an event together but then separated. Entanglement means that measuring one particle will indicate the state of the other instantaneously. If the pair happen to be a great distance apart, this can be seen as instant communication faster than light, breaking the laws of physics. Bohm uses the implicate and explicate boundary to explain this without breaking the laws of physics by not being two events but actually being a single 'non-local' event that is spread over space-time. While Einstein doubted this idea, calling it "spooky action at a distance", entanglement is now the basis of quantum computing. (See below).



David Bohm - Entanglement.

A gold fish in a tank is hidden behind a wall to represent a guantum entangled event hidden from view in the 'implicate order'. Camera A and camera B record two separate live streams of the fish from different perspectives that appear as separate events on the other side of the wall accessible to our experience, which is the 'explicate order'. When the fish wiggles its tail, it's as if two separate events are communicating instantaneously, breaking the laws of physics. In reality it is the same entangled event spread 'non-locally' over a distance.

# 1.2 WATER-BOMB FOLD: THE ORIGAMI OF BEING

Demonstrating ideas of folded space and entanglement, I introduce Bryant's idea of the ontology of the fold and the origami of being with a traditional origami water-bomb fold. Seeing ontology as the metaphysics of being, (the various factors that allow things to exist and the relationships between those factors), Bryant's paper 'The Interior of Things; The Origami of Being' looks at folded ontology, where things are folded into being with a number of examples that include a vortex or cyclone. Seeing a cyclone folded into existence by a process where surrounding weather and wind patterns are enfolded into an emergent process of becoming, Michael Serres calls the vortex a 'primal form' as it rotates and translates this information. By using an origami sphere that transforms into a vortex and dissipates back into a sphere, I show how one of Bryant's cyclones might fold into existence

Emergent processes occur when a series of factors combine to give unique configurations that are greater than a sum of their parts.<sup>5</sup> Seeming to be sometimes solid and stable, these unique events or objects fade over time back into the fields they emerged from. With a certain degree of artistic license I demonstrate this idea through the 'water-bomb' fold which is extremely flexible and is used in robotics and micro-medical devices. The key idea here is movement, which I continue to explore in my research.

## 1.3 MIURA FOLD: PARADOX

The final fold introduced is the 'Miura' fold, developed to send astro-solar sails into space by Japanese engineer Koryo Miura. This surface is folded into a series of interlocking and overlapping facets or surfaces to demonstrate Wittgenstein's idea of Family Resemblances.<sup>6</sup> This describes reality as a series of family portraits which have no single common feature, (truth), only a series of overlapping traits. The subjective differences of these portraits are represented by the different facets of the Miura fold, and their combined qualities and commonality that changes between different families compares to ideas of community within a multi-faceted whole.

A twisted surface creates the physicist's anomaly of the möbius form, that can be said to have only two dimensions but which exists in three dimensional space. Following the form with my hand I demonstrate that it makes one continuous endless surface. From the perspective of being on this surface there appears to be an inner and an outer surface which compares to the dichotomy between our 'thoughts' and the 'world' and the view that these are always connected. Moving away from the möbius surface to a 'God's eye' view moves beyond these problems, allowing us to see it as a single multifaceted whole. This introduces an Observationist perspective that sees the connections between Wittgenstein's family resemblances as a possibility for creating new communities. But this also leaves the problem that such a perspective might not be possible for those who cannot leave the surface of the möbius form. In other words, an ultimate description of reality might essentially be always incomplete and paradoxical in nature.

<sup>&</sup>lt;sup>5</sup> S. Johnson. Emergence. Allen Lane The Penguin Press. P.20-21. 2001

<sup>&</sup>lt;sup>6</sup> L. Wittgenstein. Philosophical Investigations. Macmillan Publishing Company §67. 1953.

Moving in this direction may be ultimately beyond thought, but it is an area that remains open to being explored by artistic research of the fold as a site of transformation. A folded möbius sculpture symbolises this paradox, being folded from hidden fields of possibility. A link to the video 'Un-folding Realities' can be seen here: <u>http://alexpentek.com/home/</u>

## 1.4 CONTEXTS

In the Contexts module, I introduce Bryant's 'The Interior of Things: The Origami of Being'. (Please see the precis below). From this reading I ground my research philosophically, answering the question 'what is fold' as a transformative, emergent site of becoming between being and the field from which it arrises. The relationship between being and field is a dyadic function, where two are one one is two, instead of a dichotomy. This methodology gives a blueprint to continue my research and is structured by a view that can be called Observationism. Coined during a conversation with philosopher Marcello Stamm in Hobart, 2007, observationism describes the artist's gaze resting both on and penetrating beyond the surface of things, guided here by an ontology of emergent and interconnected folds.

## 1.5 PRECIS: 'THE INTERIOR OF THINGS: THE ORIGAMI OF BEING.' LEVI BRYANT.

The key ideas advanced by Bryant and what distinguishes these propositions are as follows: Bryant give a critique of Graham Harman's object oriented ontology (OOO), as ultimately becoming 'occasionalism' through Harman's idea of 'vicarious causation' (P. 291-295). Introducing the ontology of the fold, where 'being' is folded from and unified with a surrounding 'field', Bryant offers a unity of both difference and sameness (P. 291), and the avoidance of dichotomies through dyadic function (P. 296). By using the example of the vortex as a primal form with Lucretian ideas of fluid dynamics on the edge of chaos (P. 297); Bryant discusses there being no fixed crystalline structures but instead the fuzziness of Deleuze's 'anexact' ideas. (P. 297). With no opposition to being and becoming through the idea of discrete individualities (P. 298), Bryant ends with his most important idea, the process of implication and explication through creative mutation and change, (P. 300). This is summarised by Bryant as being what he calls 'plitology', which can be defined as an origamic process of emergence and ecology. (P. 303).

Bryant offers a critique of the autonomy of objects in OOO that initially appears to give a critical alternative to rhizome-based Actor Network Theory.<sup>7</sup> (ANT). As Harman defends the autonomy of 'objects' against the popular atomistic 'undermining' of things being *really* atoms or particles, and argues against the 'overmining' of objects as being measured by their 'effect in the world' in ANT,<sup>8</sup> Harman also rejects 'process' and 'underlying connections' as forms of undermining which in my view is a mistake. (P.293). Bryant offers a refreshing critique of OOO's autonomy & withdrawal by introducing the ontology of the fold as the minimal unit of existence such that things interiorise the field from which they emerge.

<sup>&</sup>lt;sup>7</sup> J. Law. Aircraft Stories: Decentering the Object in Technoscience. Duke University Press. 2002

<sup>&</sup>lt;sup>8</sup> G. Harman. Object Oriented Ontology. Penguin Random House, UK. P. 41-54. 2018.



Performing Research, Solstice Arts Centre, Meath 2022.

Up until now, I have explored rigid origami as an expressive symbol for complex contemporary scientific and philosophical ideas. These include complex systems, cosmology and the physics of David Bohm, as well as the idea of an underlying interconnectedness. The ontology of the fold allows a shift from seeing the fold just as a sometimes obscure visual metaphor to being the conceptual framework and fluid mechanism of an ontology that opens the door to new possibilities. I build on these ideas and experience as the basis for material-led artistic research, investigation, pedagogy and praxis

# 2. RATIONALE

Origami is used in a range of mathematical, scientific and cosmological applications. These include robotics,<sup>9</sup> design thinking,<sup>10</sup> engineering, micro-medical devices, architecture, space exploration and the study of spiral galaxy formation. In the repeated folds of 'rigid origami's deployable surfaces, however, something else is happening on a subtle level that is often overlooked: Can transforming surfaces also have meaning from an emergent,

<sup>&</sup>lt;sup>9</sup> G Hao<sup>1</sup>, A Pentek<sup>2</sup> Art into Engineering: Demonstrating how Origami creativity can inform Robotics education of Engineering, University College Cork (UCC), Republic of Ireland. P.1. 2021.

<sup>&</sup>lt;sup>10</sup> B. Supple<sup>1</sup> S. O'Neill,<sup>2</sup> G. Hao<sup>3</sup> A. Pentek<sup>4</sup> Beyond Paper Folding: Origami and Focused Play to Enhance Interdisciplinary Learning and Teaching in Universities. AISHE-J. P.3 2021

meta-physical perspective? Looking at the fold as a site of transformation on this primary level can face questions of emergence and possibly lead to insights and discoveries through material-led artistic research.

2.1 For example, when we gesticulate it is believed to not simply be a primitive expression of inner thoughts travelling outwards, but can also move backwards to inform and help crystallise un-formed thoughts by a process of 'extended cognitive theory' and the 'parity principle' put forward by Andy Clark.<sup>11</sup> Based on this rationale, I explore similar two-way informative aspects of the fold as a praxis by material-led research in a mix of video, live performance and sculpture. The outcome of this research is an enhanced understanding the fold as a transformative process. This shows promise as a rich area of investigation that deserves a more comprehensive study in the future. Physically, this has manifested with a new direction of sculptural work that fuses the metaphysics of the fold described above with familiar items of everyday furniture that are disrupted and transformed to become 'useless objects'. As artworks, this series of 'meta-sculpture' and video work is intended to have a life of its own for viewers, bringing new meanings through Ernst Gombrich's 'beholder's share'.

2.2 We can also see a similar two-way function of perception as a creative *and* sensual process in the contemporary scientific writing of neuroscientist Anil Seth.<sup>12</sup> In his paper 'From Unconscious Inference to the Beholder's Share: Predictive Perception and Human Experience', on page 1 Seth quotes Gombrich who says "It is the power of expectation rather the power conceptual knowledge that moulds what we see in life no less than in art." Seeing artistic research as being parallel to scientific research, Seth explains how for the sake of economy, we predict as much as possible about the perceived world. This can be described as *we perceive the world not as it is, but as our brains predict it to be*. (See below).



Close the right eye and focus on the +. Move the page towards your face until the blank circle disappears but the grid appears complete. (faculty.washington.edu)

<sup>11</sup> A. Clark. Supersizing The Mind. Embodiment, Action and Cognitive Extension. Oxford University Press, New York. P.28. 2008.

<sup>12</sup> A. Seth. From Unconscious Inference to the Beholder's Share: Predictive Perception and Human Experience. Sackler Centre for Consciousness Science, Department of Informatics, University of Sussex, Brighton. P.1. 2019

The complexity of folded surfaces is difficult to predict after just a short number of folds. To understand folds, we must first fold. According to Clarke, we extend cognitive processes of understanding beyond our bodies into the world and materials by using real-world objects as cognitive tools. With the cognitive process extended to include objects, which may in turn reveal material insights to us while we use them, my rationale for material research of the fold is based on the unpredictable outcomes of this direct first-hand experience.

#### 3. FINDINGS & CONCLUSION

This research has been process-based and qualitative, (not quantitive), meaning that there is no traditional hypothesis, research, analysis to be proven. However, observing the complexities of folded surfaces in context with the ontology of the fold has proven to be a personally fruitful exercise worthy of further study and investigation. This has enabled me to situate my practice against influential post-modern theories like Actor Network Theory, Object Oriented Ontology and the late phenomenology of Merleau Ponty,<sup>13</sup>(with whom Observationism is most aligned with). While I disagree with some points in Graham Harman's Object Oriented Ontology, his writing is lucid and enjoyable none the less, and his bringing of metaphor as an important descriptive tool for objects is a debt that cannot be repaid.

It is also refreshing to see new ideas in philosophy with Speculative Realists such as Harman and Bryant taking a stance against the correlation in phenomenology between thoughts and the world. In Naked Punch, 05/06/2012, Harman says "The depth of philosophy can be judged by the importance of its enemy." Taking Harman's work as a *thesis*,

Bryant provides an antithesis with the 'Origami of Being'. Observationism may be a synthesis of these and other incompatible views. as it accepts perception as a learned, biased and predictive process without the need to reduce or resolve our experience, seeing everything connected by emergent, non-deterministic processes. While a subjective point of view can be can be criticised as being incompatible with an ontology that remains beyond our experience, adopting the fold as first philosophy is a compliant framework that allows us to rise above these obstacles. Like an origami möbius surface, this view accepts that not all paradoxes need resolving. The final part of this research manifests as a series of sculptural and performance works. These 'meta-sculptures' are a playful interpretation of my research, mixing forms of familiar everyday house-household furniture and turning them into 'useless objects' and artworks.



Meta-chair. 2022

<sup>&</sup>lt;sup>13</sup> M. Merleau Ponty. The World of Perception. Routledge London & New York. 2004

### 4. APPENDIX: WHAT IS FOLD?

Fold is the emergent and transformative edge between being and the field from which it both arises and enfolds within itself. Levi Bryant calls this folding of 'being' from 'field' and the enfolding of that field into being not two separate opposing functions but instead, together they make one single dyadic function, (DF), where two are one and one is two. (DF 2=1, 1=2).

To illustrate the question 'what is fold' beyond a physical example like folded paper - but instead looking at the materiality of paper itself, (and how it is derived from wood) shows the following number of 'folds' from various fields that allow paper itself to come into material being:

4.1 The historical fold: On Earth, the natural history of wood begins with the first photosynthesis of single cells in the Archaean age 3.7 billion years ago and later the absorption of chlorophyll by multicellular organisms in the Paleoproterozoic period 2.1 billion years ago. These developments were folded into the first plants of the Ordovician period 470 million years ago and the first trees of the Devonian period 390 million years ago. <sup>14</sup>

4.2 The environmental fold: Changing weather and seasonal conditions includes global weather patterns, ocean currents and ice ages. These are folded into growth patterns that can be measured by the changing thickness of growth rings, known in archaeology as dendrochronology. Current climate change and global warming caused by the burning of fossil fuels can also be observed here.

4.3 The Geological fold: This is also folded into the environmental and the historical fold but is defined by geological and astronomical events, such as earthquakes, volcanoes, plate tectonics, erosion, river delta formation, rock and soil composition. There is geological evidence of dramatic climate change such as Fimbul-Winter, where 3 successive year-round winters caused by volcanic dust in the atmosphere blocked sunlight, and also of mile-high tsunamis possibly caused by large celestial bodies passing close to earth or from numerous asteroid impacts.<sup>15</sup> Fossilised trees, stones, and bones in archaeology bear mute witness to these trials and tribulations that have raged across earth.

4.4 The Ecological fold: This is folded into the geological, environmental and historical fold. As well as enfolding the above, the ecological fold sees species of trees adapting to the ecology of surrounding flora, and fauna. With selective planting and genetic mutation and alteration, human proximity also plays a large factor in the ecological fold, in how it has affected species development and growth and/or disappearance.

<sup>&</sup>lt;sup>14</sup> R. Fortey. Life: An Unauthorised Biography. A Natural History of the First four Billion Years of Life on Earth. The Folio Society; . P.5-95 2008

<sup>&</sup>lt;sup>15</sup> I. Velikovsky. Earth In Upheaval. Abacus/Sphere Books. London. P.120-122. 1973

4.5 1st Material fold: Once a tree has been felled, there is a sub-set of material folds that are part of the lumber process, depending whether it is to become paper or wood. Broadly speaking, these are as follows:

4.5 (a) Lumber process, harvesting.

4.5 (b). Drying process.

4.5 (c). Sawmill process, further drying or treating.

4.5.(d) Paper pulping, paper-making process. Or

wood-finishing process.

4.6 2nd Material fold: This includes the final printing, artistic and/or origami folding process for paper. For wood, there is the final sculpting, crafting or construction process.

4.7 The design fold: Either a mass-produced or bespoke artefact, paper or wood material enfolds the the 2nd material fold as well as all the preceding folds. The design fold includes art-historical and contemporary design, and can also include industrial design, socio-political affairs, the military-industrial complex, contemporary art practice, philosophy and critical texts. At a quick glance the above loosely shows that for paper and wood, there are approximately 10 folds and processes of becoming that are folded from and enfolded with at least 7 different fields or areas of potential. Seeing the fold as a site of transformation and becoming provides a lens to focus and define being as an ongoing emergent process without being reductive. This approach remains open to change and influences from other fields, and in fact is defined by change instead of fixed qualities.



Meta-table (back) residual artefacts from live performance The Origami of Being (front).

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