



# Patterns That Connect

*Dawn Whitehand*

*But if one wishes to understand reality as it is, then the scientist, the artist and the philosopher should try to understand the value of each others' fields for the benefit of their own development.*

—Fre Ilgen, 2004

The production of ceramics can be, in itself, a demanding scientific process. Clay bodies, glaze technology, kiln firings; all are calculated by the ceramicist to have precise visual effects encapsulated within the final art piece. The type of clay body, the shape realized through forming techniques and the selection of surface effects contained within my sculptural works are deliberately designed to trigger particular subconscious responses within the viewer. My interest in such subconscious responses is inspired by many recent developments in science: innovative theories centered on a non-linear, holistic approach that illustrates a move away from the positivist explanatory paradigm of the past. Many of these ideas share an emphasis on patterns and interconnectedness. It is these inventive concepts that have inspired the body of work discussed in this article.

## POST-POSITIVIST SCIENCE

As post-positivist science evolved during the mid- to late 20th century, a more holistic approach to scientific research emerged and became widely accepted within the discipline. One indication of this new perspective was the discovery throughout natural forms of patterns, layers and textures, all of which carry significant implications for aesthetic discourse, opening new avenues of insight and interpretation for the creative artist. Although the scientific findings are complex and somewhat speculative, I propose in this paper that the representational problems encountered in this work benefit from an aesthetic analysis. As I discuss below, artists throughout history and across cultures have frequently employed motifs and patterns similar to those scientists now work with in their laboratories. In light of this concurrence, emerging scientific knowledge of the universe may point to a possible innate human recognition of and response to certain geometries and forms. While I do not critically engage the validity of the scientific theories (I am, after all, an artist, not a scientist), such discoveries and ideas have come to inform the development of my visual works in form, surface finish and configuration.

Dawn Whitehand (artist, student), 37 Tierneys Road, Dunnstown, Victoria, Australia, 3352. E-mail: <dawnspots@iprimus.com.au>

This article is part of the Leonardo special section "ArtScience: The Essential Connection."

**Article Frontispiece. *Water Spiral*, wheelthrown, manipulated, burnished and pit-fired stoneware clay, mounted in water on bamboo rods, dimensions variable, 2007. (© Dawn Whitehand)**

## THE CERAMIC SCULPTURE

As a ceramic artist, I view clay as a poignant elemental metaphor. Being intimately of the earth, clay is able to trigger phenomenological and ontological responses within the viewer. A form made from clay "contains" both the reality of the materials and process, and the inner realities of man's [sic] sense of identity in relation to his [sic] own world of meaning" [1]. Each clay sculpture creates a "focal point where strands of meaning related to life, use, and symbolic thought

are knotted together, it reflects back into the mind of each owner or user an image of himself [sic] as existing in his [sic] world" [2]. I believe, therefore, that clay exhibits the potential to stir subconscious emotive responses. By constructing a visual language composed of clay forms that are related to innately recognized patterns, textures and symbols, I create an environment with this artwork that shows it may be possible to highlight the phenomenological and ontological properties of clay. The techniques I apply to realize these objectives include manipulation, which achieves an organic, intuitive form; surface treatment, such as fractal-like glazes; configuration of multiple pieces into spirals and circles; and the technique of installation, which is used to create holistic and interconnected environments.

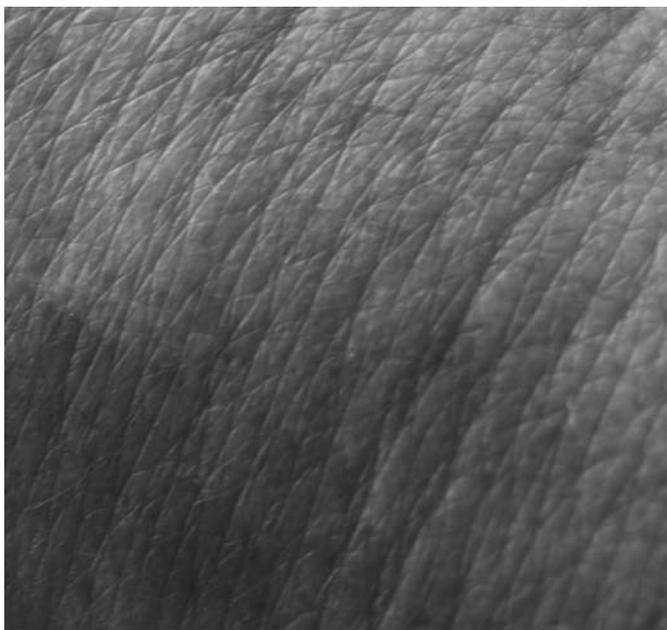
Manipulation of the individual clay pieces achieves an intuitive organic form that, when glazed and assembled in certain configurations, might stir the subconscious memory as suggested by Jung and more recently by evolutionary psychologists. Evolutionary psychologists believe humans have evolved to recognize symmetry in their environment as a survival mechanism. We appear to be able to process geometric shapes faster than other elements in the landscape, enabling us to survey the vista more efficiently and thus escape potential danger more quickly [3]. These geometric shapes are part of an overall organic environment, and by glazing the manipulated forms with a fractal-like surface and arranging them in geometric configurations, I aim to trigger subconscious memories within the viewer.

## "THE INNATE IDEA"

René Descartes (1596–1650), a pivotal figure of the 17th century who participated in the emergence of modern philosophical and scientific thinking, believed the mind possessed an inborn awareness of certain fundamental concepts [4]. This notion is also reflected in Jung's [5] collective unconscious the-

## ABSTRACT

Despite the rationalist approach to science over the past four centuries, some physicists hold that new ideas mirror metaphysical perspectives of the natural world. The implications of these recent scientific theories present significant and complex interpretative problems for researchers who adopt a more traditional or rationalist philosophical position. Through her artwork, the author provides a conduit for a visual interpretation of the former, more holistic approach. She uses innately recognized symbols that appeal to humanity's natural and spiritual understandings of the environment and the cosmos. This cross-disciplinary artwork parallels contemporary scientific insights into our natural environment and the physical world that characterize, for example, Bohm's conception of implicate order.



**Fig. 1. Human skin. (Photo © Dawn Whitehand)** The ever-repeating pattern within human skin illustrates the development of fractals not only within the environment at large but also within humanity.

ory [6], where it is expressed through the idea of archetypes [7] that emerge cross-culturally in art, religion and dreams. Evolutionary psychology [8] and Darwinian aesthetics [9] are among the fields of inquiry that have explored these theories in recent decades, extending the notion of “innate pattern recognition” and suggesting evolutionary reasons for this apparent “innate” recognition.

Denis Dutton, associate professor of philosophy and religious studies at the University of Canterbury in New Zealand, is a recent exponent of Darwinian or evolutionary aesthetics, a field that studies “the deepest nature of our apprehension of beauty” [10]. Dutton’s research suggests the “existence of a universal aesthetic psychology” [11] and implies that artistic virtuosity and appreciation “is not a social construct” [12]. Instead, over successive generations, displays of dexterity would have been admired and encouraged. Mate choice would have been influenced by this factor, so that such talents would survive in subsequent generations [13], along with an encoded memory to recognize these elements. This idea of encoding implies that our likes and dislikes are not necessarily wholly explained by culture, and may explain our “innate” responses and intuitive “gut” reactions.

## FRACTALS

This notion of encoding has also been proposed by Richard Taylor, associate professor of physics, psychology and art in the Department of Physics at the University of Oregon, in his discussion of “fractal scenery” [14]. He suggests: “Humanity possesses an affinity with these

fractals and an implicit recognition of their qualities. Indeed it is possible to speculate that people possess some sort of ‘fractal encoding’” [15]. While Taylor is referring to a more psychological recognition, such encoding would not be surprising, as fractals are part of our own physical evolution, the texture of human skin and the structure of our lungs being two examples (Fig. 1).

These patterns also surround us in spider webs, honeycombs and seedpods because, as an efficient use of surface and space, the fractal has been naturally selected throughout evolutionary history. John Barrow has suggested “their ubiquity in the natural world of which we are a part is one reason we find them so comfortingly attractive” [16]. It is this innate recognition and the “comforting” quality these patterns stimulate that prompt me to use the fractal in my artwork as a powerful tool for stimulating positive subconscious responses within the viewer. The glazes I develop, therefore, while prompting a tactile experience, are also intended to capture fractal patterns visually and conceptually.

I currently employ two types of glazes within my art practice to conceptualize the fractal: a dry cracked glaze (Fig. 2) and a volcanic, crater-like glaze (Fig. 3).

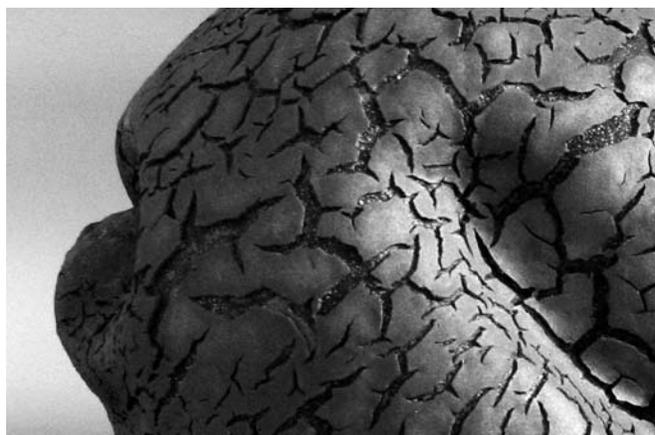
The dry cracked glaze is achieved by formulating a high-clay, low-silica (glass former) glaze mixture. The resultant glaze will shrink and contract away from the clay body during firing rather than melting and forming a glass covering over the object. The volcanic glaze is achieved with the addition of silicone carbide to the glaze formula, causing craters to appear during the firing cycle. These

craters must be stopped at a certain temperature, because if the firing temperature is too high the craters will become molten and will seal over. It is hoped that the visual presence of objects glazed this way will conjure the “comforting” quality to which Taylor refers. While patterns such as fractals within the environment are pertinent factors in my concept development, certain shapes and symbols are also vital.

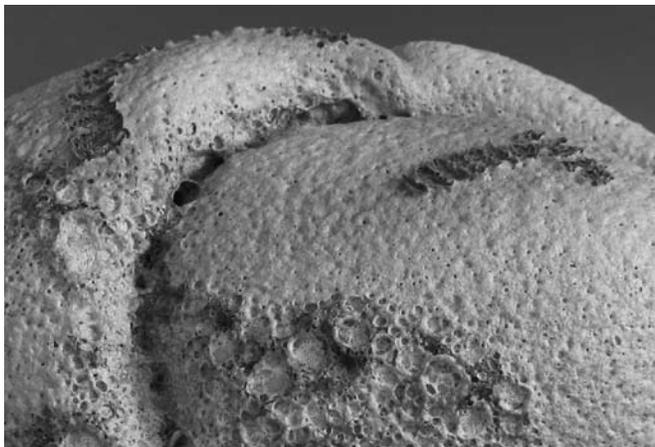
## PATTERNS

The coining of the term *metapatterns* by Gregory Bateson in *Mind and Nature* and Tyler Volk’s recent re-exploration of this term in *Metapatterns: Across Space, Time, and Mind* reinforce this concept of ever repeating and layered patterns that are interconnected within our universe. According to Bateson, a metapattern is a “*pattern which connects.... It is a pattern of patterns*” [17]. The metapattern theories suggest that traditional Euclidian geometry, which was previously employed by positivist science to explain processes in a measurable linear fashion, is no longer adequate for complex phenomena. Instead, researchers have increasingly turned to non-linear dynamic systems that generate natural patterns and sequences that are neither random nor predictable.

Since these natural patterns and sequences have always existed, they touched the cultural imagination even before they were “discovered” by scientists and mathematicians. The work of evolutionary psychologists and the visual pattern recognition theories mentioned above may explain why artists across many cultures have incorporated so many similar aesthetic elements into their artwork. I propose here, based on these studies, that the conception phase of artmaking includes unconscious perceptual processes that detect and recognize ecologically important shapes and textures; this recognition has been of evolutionary benefit in the past, and therefore these patterns and textures emerge and appear in visual images [18]. Due to their innate nature many patterns have evolved into symbols and are, therefore, an ideal tool for the artist to employ as they offer more than an obvious and immediate meaning. Jung believed symbols to be inherited, psychic aspects of brain structure [19]. Thus they have a wider unconscious aspect that cannot be fully defined or explained. [20]. Due to this apparent innate nature, patterns are inherently recognized and universally interpreted. The symbols I employ in my artwork include spirals, circles and mandalas.



**Fig. 2. Dry black glaze.** (© Dawn Whitehand) Glaze is applied thickly in order to maximize the fractal-like surface.



**Fig. 3. Volcanic glaze.** (© Dawn Whitehand) Glaze is applied unevenly to gain a variety of crater sizes, while retaining a strong fractal like surface.

Fibonacci recognized the mathematical formula for a type of spiral that appears biologically in nature, such as in the growth of a snail shell or the uncurling of a fern frond. The spiral, as expressed through the Fibonacci sequence, appears in formations of nature from seashells, pinecones and pineapples through to spiral galaxies (Fig. 4).

This may be a result of nature's efficiency: This structure has evolved through natural selection to be the most efficient, enabling, for example, the maximum number of seeds to be formed within the smallest space [21]. As humanity has evolved concurrently with this formation, we innately recognize it, and so it has become a symbol reflected in myth universally and across cultures, a "schematic image of the evolution of the universe" [22]. The spiral, therefore, has become one of the "essential motifs of the symbolism of ornamental art all over the world" [23].

Visually I conceptualize the spiral through multiplicity—using many pieces to form a complete sculpture—and through the manipulation of individual pieces. *Water Spiral* illustrates both of these techniques (Article Frontispiece).

Multiple pieces are installed en masse within the water, forming a spiral, and individual pieces are manipulated to reflect the organic environment. It is hoped that such an installation will draw the viewer to the meditative qualities of water, but will also prompt deep reflection regarding our responsibility toward the earth and the fragility of the vast numbers of species that rely upon it for survival.

Other patterns I use in my art practice

**Fig. 4. Spruce pinecones illustrate the ongoing spiral pattern of the Fibonacci sequence.** (Photo © Dawn Whitehand)



include circles and mandalas. As an inherently recognized symbol, the circle was "probably embedded... in human consciousness" [24] due to parallels with the sun, moon, planets and stars; hence the speculation of some natural historians that stone circles had astrological purposes [25]. We also see this in later sundials, even in modern times. The circle was recognized as a potent symbol and widely used in many primitive cultures [26]. The Native North American Sioux Indians did "everything... in a circle... because the Power of the World always works in circles, and everything tries to be round" [27]. Many tribal cultures also understood concepts of interconnectedness and the need to be close to the cosmos. This makes the circle, manifested in the configuration of multiple forms together within a natural space, a poignant symbol to utilize when creating an installation (Fig. 5).

Enclosed within a square, the circle becomes a mandala [28]. Jung viewed the mandala as a holistic symbol for oneness and completion of self and, because it appears in many cultures and religions, he saw it as an archetype of the collective unconscious [29]. This claim is strengthened by the existence of Rhodesian (now Zimbabwean) rock engravings from the Paleolithic Age [30]. The square symbolizes the earth [31] and, when combined with the circle, strives to unite heaven with the earth, encouraging order, rendering the mandala a potent symbol to invigorate the contemplative nature of an installation (Fig. 6).

Paralleling the above ideas of patterns and layers is David Bohm's concept of implicate order. Bohm was dissatisfied with theories that "only discussed what could be observed and measured" [32]. He aspired to develop a theory of reality that was inclusive and holistic [33]. Impli-



**Fig. 5. Stone Circle, wheelthrown, manipulated, burnished and pit-fired stoneware clay, dimensions variable, 2008. (© Dawn Whitehand)**

cate order suggests an invisible underlying structure to which everything in the micro and macro of nature is connected. All objects in existence have unfolded from this implicate order to become explicate in the everyday, while still being enfolded as part of the underlying and imperceptible implicate structure [34]. This enfolding captures finer and finer aspects of the implicate order and “could go on indefinitely” [35]. While this indefinite pattern applies to the fractals, as discussed earlier, it also inspires my use of multiplicity within my art practice.

*Water Spiral* illustrates multiplicity’s ability to echo the enfolded indefiniteness of Bohm’s theory. The spiral configuration heightens this connection, as spirals also hold an infinite possibility, by both folding in upon themselves and folding out in ever increasing arms.

Installation is the method I use to incorporate all the techniques I discuss to create a meditative and potentially transformative environment. Just as quantum physics [36] has allowed scientists to describe the world mathematically with a precision and detail previously unknown, encouraging humanity to rediscover its place within the universe, art installations have the capacity to provide an ontological experience that offers the viewer an alternative opportunity to redefine their place within the cosmos.

During the 1960s, scientists began studying the dynamics of natural processes that had previously been thought to be random and haphazard and found them to be ordered and deliberate. Such research led to the development of chaos theory and complexity theory. Chaos theory is “the study of non-linear dynamic systems... that cannot be visualized in a graph with a straight line” [37]. Scientists

found “deep patterns” identifying order in “seemingly unpredictable systems” [38]. Complexity theory originated in particle physics and is applied to systems where thousands of units form a larger collective, including social, cultural or political spheres, to predict outcomes based on the evolving patterns that emerge within those systems that repeat and layer [39]. Together these theories suggest that when a group of evolving autonomous particles interact, “the resulting global system displays emergent collective properties, evolution and critical behavior that have universal characteristics” [40]. This implies that, as systems become more complex, instead of degenerating into chaos, as was expected on the basis of prior conceptions of the universe, this

**Fig. 6. Mandala, wheelthrown and manipulated stoneware clay, volcanic glaze, fired to 1260° in oxidized atmosphere in electric kiln, dimensions variable, 2008. (© Dawn Whitehand)**



process of synchronization forms coherent patterns. An installation can visually manifest this idea by combining the various techniques discussed to create an environment that, when constructed of varying components, becomes more complex; yet, at the same time, this complexity creates a holistic environment that may allow viewers to reassess their place within the universe.

My most recent explorative work attempts to embody this concept. Multiple configurations are being installed in a heavily wooded landscape, to be experienced by the viewer within a circle that is sited within a circle of trees. The artworks are viewed through circular portals made of sticks and suspended between branches. The aim of the work is to create a space that reinvoles the sacred qualities of the landscape. My challenge is to mirror the above theories and retain the coherent quality of the installation as it becomes more complex, creating a calming environment for the viewer.

## CONCLUSION

While an holistic stance may have always existed within art practices, a less positivist approach within scientific practice is a recent development. This cross-disciplinary urge toward more holistic thinking may explain why some scientists are exploring areas that go beyond the equation. We might compare their willingness to consider qualitative options with the artist’s capacity to embrace intuitive notions. The integral approach of artists has traditionally placed them in an optimal position to create a universal and inher-

ently recognizable visual language. This is a tradition that continues today as artists explore scientific knowledge and give visual representation to novel scientific theories and knowledge.

As I have shown, a multidisciplinary methodology leads to a cross-fertilization of knowledge, leading to new understandings and insights, because “the various aspects of artistic experience in visualizing intuited knowledge about nature’s processes...can offer the scientist alternative (additional) means for his [sic] scientific research. Finding analogies between art and science must therefore be understood as a justified and useful approach” [41].

## References and Notes

*Unedited references as provided by author.*

1. Philip Rawson, *Ceramics* (London: Oxford University Press, 1971), 8.
2. Rawson [1].
3. Fre Ilgen, *Art? No Thing!* (Netherlands: PRO Foundation, 2004), 350.
4. Richard L Gregory, ed., *The Oxford Companion to the Mind* (New York: Oxford University Press, 1987), 189, 371.
5. Carl Gustav Jung (1875–1961). Swiss psychologist, born in Kesswil, credited as a major contributor to modern personality theory and psychotherapy. See Edward Hoffman, ed., *The Wisdom of Carl Jung* (New York: Kensington Publishing Corp., 2003), 3.
6. Jung believed human traits and personality go back to the dawn of time and display universal characteristics carried within the unconscious mind, and shared by all humans due to our common ancestral past. These common experiences have left a permanent impression on the human mind. See John W. Santrock, *Psychology* 7, 7th ed. (Boston: McGraw Hill Companies Inc., 2003), 483.
7. The term Jung used to describe the ideas and images expressed through the collective unconscious that carry symbolic meaning for all people. See Hoffman [5].
8. Evolutionary Psychology seeks to understand the psychological and cultural life of humans within the context of their genetic inheritance: all species have evolved to increase their fitness for survival and reproduction. Evolutionary Psychology extends the findings of Darwinian theory to the workings of the human psyche. Some findings directly contradict twentieth century art theorists who view aesthetics as a value culture teaches us. See *Aesthetics and Evolutionary Psychology*, 2003, Oxford University Press. <www.denisdutton.com/aesthetics\_&\_evolutionary\_psychology.htm>.
9. Darwin suggested that humanity recognizes beauty inherently but could not satisfactorily explain this phenomenon. Twentieth century research has explored the possibility of human cognition responding to physical structures in the environment, that over time, the human psyche has evolved to recognize. See *Evolutionary Aesthetics*, ed. Karl Grammer and Eckart Voland (Berlin: Springer, 2003).
10. Denis Dutton, “Hardwired to Seek Beauty,” *The Australian*, 13 January 2006.
11. Dutton [10].
12. Dutton [10].
13. Dutton [10].
14. Richard Taylor, “Fractal Expressionism: Where Art Meets Science,” in *Art and Complexity*, ed. J. Casti and A. Karlqvist (Amsterdam: Elsevier Science B.V, 2003), 142.
15. Taylor [14].
16. John Barrow, *The Artful Universe* (New York: Oxford University Press Inc, 1995), 62 [emphasis added].
17. Gregory Bateson, *Mind and Nature: A Necessary Unity* (New York: Bantam Books, 1988), 11 [emphasis in original].
18. Richard G. Coss, “The Role of Evolved Perceptual Biases in Art and Design,” in *Evolutionary Aesthetics*, ed. Karl Grammer and Eckart Voland (Berlin: Springer, 2003), 117.
19. J.E. Cirlot, *A Dictionary of Symbols*, 2nd ed. (London: Routledge & Kegan Paul Ltd, 1971), xxxv.
20. C.G. Jung, “Approaching the Unconscious,” in *Man and His Symbols*, ed. C.G. Jung (Garden City, NY: Doubleday, 1964).
21. K. Lee Lerner and Brenda Wilmoth Lerner, eds., *Gale Encyclopedia of Science*, 3rd ed. (Detroit: Gale, 2004), 1606.
22. Cirlot [19] 305.
23. Cirlot [19].
24. Tyler Volk, *Metapatterns: Across Space, Time and Mind* (New York: Columbia University Press, 1995), 155.
25. Archaeoastronomers claim stones were placed and circles constructed in the landscape to align with particular astrological cycles. The position in relation to the skyline was also important, as were the shadows cast as they may have pointed to aspects within the topography. Some examples include New grange, Stonehenge and the Stones of Stenness. See Paul Devereux, *The Sacred Place: The Ancient Origins of Holy and Mystical Sites* (London: Cassell & Co, 2000), 136-40.
26. Cirlot [19] 46.
27. John (Flaming Rainbow) Neihardt, *Black Elk Speaks: Being the Life Story of a Holy Man of the Oglala Sioux* (Lincoln: University of Nebraska Press, 1961), 198.
28. Mandala is the Hindu term for circle. See Cirlot, *A Dictionary of Symbols*, 199.
29. Michael W. Passer and Ronald E. Smith, *Psychology: The Science of Mind and Behavior*, Second ed. (Boston: McGraw Hill Companies Inc., 2004), 437.
30. Cirlot [19].
31. Cirlot [19].
32. Andreas C. Papadakis, ed., *Art Meets Science and Spirituality* (London: Academy Editions, 1990), 28.
33. Papadakis [32] p. 27.
34. American born quantum physicist David Bohm (1917–1992) continued developing his theory till his death. See Ilgen [3] 32.
35. Papadakis [32] 29.
36. The study of the fundamental structure of all matter. See David T. Suzuki, *The Sacred Balance: Rediscovering Our Place in Nature* (St Leonards, NSW: Allen & Unwin Pty Ltd, 1997), 232.
37. Lerner and Lerner [21] 816.
38. Lerner and Lerner [21].
39. Paul Greenhalgh, “Complexity,” in *The Persistence of Craft: The Applied Arts Today*, ed. Paul Greenhalgh (New Brunswick, NJ: Rutgers University Press, 2003), 196–198.
40. Christa Sommerer and Laurent Mignonneau, “Modeling Complexity for Interactive Art Works on the Internet,” in *Art and Complexity*, ed. J. Casti and A. Karlqvist (Amsterdam: Elsevier Science B.V, 2003), 86.
41. Ilgen [3] 185.

---

Manuscript received 15 October 2007.

*Dawn Whitehand has been a practicing ceramicist and teacher for 10 years. She is currently undertaking her Ph.D. at the University of Ballarat, where she is drawing on art, science and philosophy to explore the intrinsic qualities of clay’s potential to reinvoke the sacred within the landscape.*