The double spiral and ways of knowing

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Abstract: Selected aspects of traditional knowledge and modern scientific knowledge are discussed to see how the different approaches might converge in their understandings and explanations of phenomena. Following an outline of the two approaches, traditional ideas about the double spiral motif (takarangi) are related to homeokinetics and spiral dynamics which are theories from contemporary physics. Several parallels are identified and it is concluded that there is considerable commonality between the two knowledge traditions as exemplified by the specific examples presented herein.

Keywords: homeokinetics; scientific knowledge; spiral dynamics; traditional knowledge

Introduction

All ethnicities and cultures share an existence in the same place. It is a place that is formed by the stars, the sky, the sea, the air and the land. However, within this immense world are other worlds in which different cultures define 'being' or 'existence' in different ways. So while we are unified as human beings at the broadest level, there is a diversity of 'existences', a diversity of world views. This diversity stems from different philosophies, different belief systems and different knowledge systems; and these usually lead to different practices. Such diversity of cultures is both enriching and enlightening.

In the simplest case, if we consider the co-existence of two worlds, it is clear that each has a part that is specific to itself and another part that is shared in common with the other world (Williams, 2006). Therefore, as each world learns to relate more to the other, then the overlap increases. This area of commonality is the area of duality or bi-culturality. As we add more worlds and more overlaps, the state of commonality rests on multi-cultural understandings.

Whatever the culture, a key part of 'being' is the knowledge and understanding of various phenomena so that it provides meaning to existence. This paper first outlines ways of knowing with particular reference to the scientific method, then compares it with elements of Maori traditional ways of knowing.. The aim is to highlight both the unique and the common ground.

Pragmatic ways of knowing

The American philosopher Charles Peirce held that there are four main ways of knowing; and as noted by Kerlinger, knowing was regarded by Peirce as "fixing belief" (Kerlinger, 1973, p.5). The first way of knowing is called the *method of tenacity* where people hold very firmly to the truth because they just know it is the truth and because it has always been that way. The common dilemma here is that such truths or beliefs are often maintained even when there are conflicting facts.

The second method of knowing is the *method of authority* where the authority can be a canonized revered source of knowledge such as the Bible, a noted leader, public opinion or the weight of tradition. While progress can be slow it can be very sound. Of course, under certain conditions, as for example where the primary authority for a small country is a non-benevolent dictator, progress can be unsound.

The third way of knowing is the *method of intuition* where propositions are based on what seems rational and self-evident. The idea is that with lots of dialogue people will naturally converge on the truth. The difficulty is that using rational processes, people can reach different conclusions, so the challenge is to decide which one is right.

The fourth method of knowing is the *method of science* where the aim is to be objective and to understand things in a way that is independent of the personal opinions, beliefs, and attitudes. In this approach, the scientific world is in a sense that lying outside the scientist.

The scientific way

The basic aim of science is to explain natural phenomena. It does this by building and confirming theory. A theory is made up of constructs, definitions and propositions that are designed to pin down the relations among variables. It does this in a systematic and critical manner. As a result of this approach, the sub-aims of theory are to understand, to explain, to predict and to control. It seeks a level of precision that is highly objective without being confounded by other variables. The scientific way is tightly disciplined. First, with the investigator putting his or her view to a test that is objective and essentially outside the self; and second, with the work being subjected to scrutiny by peers.

As most scientists would agree, while it is exciting working with the unknown, seldom does the process go smoothly. In a book of essays entitled "Science is human" the late Professor Hugh Parton, a former Mellor Professor of Chemistry and Pro-Vice-Chancellor at the University of Otago, wrote: "Science is human: it errs and it learns from its errors" (Pankhurst, 1972; p.40). It is pertinent too that he reminds us that there is a lot of creativity in science by stating that "Scientific theories are human invention, they are instruments of thought" (p.39). He goes further to say that "The creation of scientific hypotheses is an art" (p.40). Parton reminds us that despite the drive for the rigorous, systematic and critical approaches underlying the scientific method of knowing, human qualities remain embedded.

The 'traditional' Māori way

The Māori world-view is wholistic and encompasses the cosmos. An illustration of this is a poetic chant recorded by Te Kohuora in 1854. It begins with:

Nā te kune te pupuke	From the conception the increase (growth)
Nā te pupuke te hihiri	From the increase the thought
Nā te hihiri te mahara	From rising thought the memory
Nā te mahara te hinengaro	From memory the consciousness (mind-heart)
Nā te hinengaro te manako	From the consciousness the desire
Ka hua te wānanga	Knowledge became conscious (fruitful)
Ka noho i a rikoriko	It dwelt with feeble glimmering
Ka puta ki waho ko te pō	And Pō (darkness) emerged
Ko te pō nui, te pō roa	The great night, the long night

(cited in Henare, 2003, p.75).

Here, the unfolding of the universe is described as a birth, beginning with conception and the consequential development of growth, thought, memory and consciousness. The long night that follows refers to aeons in the womb and the next part of the chant refers to the state of nothingness,

then comes the wind of life ("…ko hau ora") and finally a burst of life into the material world of light, te ao mārama. Tihei mauri ora! is the well-known call that celebrates that bursting forth of life.

Other cosmological accounts tell of the emergence of Ranginui and Papatuanuku (the sky father and the earth mother) and allow a consideration of the foundation and creation of all things. A feature of Māori philosophy and knowledge systems is the inter-connectedness of transcendental and phenomenological levels of understanding. It reflects a wholistic and vitalistic view of the world. So the whakapapa begins at a cosmological level, through the earth and the sky, through the god-children, through the generations of humans to the present and into the future. So one's sense of existence is transversal from the beginning when there was nothing.

The story of Tanenuiarangi fetching the three baskets of knowledge from Rangiatea in the first over-world creates the link from *kawa atua* (the source of knowledge in the spirit-world) to the knowledge constructed by humans which is called *tikanga tangata*. These sources of knowledge are foundational to the cultural concept of *ritenga tangata* which is how humans behave in the real world (Henare, 2003).

Although the philosophy, metaphysics and religion making up the world view is generally articulated by the use of metaphor, it establishes a conceptual basis for understanding the universe and the place of people in it. That conceptual basis, which is broad and wholistic, offers an underlying logic that has explanatory power. Moreover, the stratified layers of stories that make up the whakapapa create a link and reciprocity between the time of darkness to the present, and to the future.

The particular authorities on cosmological and religious knowledge were the sacred priests known as *Tohunga*. They were charged with the responsibility of "establishing, maintaining and explaining the relations between things of creation" (Henare, 2003, p. 74). Specialised schools of learning (*whare wānanga*) existed before European arrival and the protocols and practices for higher learning were of a high order. The application of sacred and constructed knowledge to human behaviour (*ritenga tangata*) was guided by tohunga and it requires an understanding of the underlying elements or principles of the world view. Henare (2000, p.3) has outlined these principles as follows:

Te ao mārama	Wholeness, cosmos
Mauri	Life essences, vitalism, reverence for life
Tapu	Being and potentiality, the sacred
Mana	Power, authority and common good
Hau	Spiritual power of obligatory reciprocity in relationships with nature
Wairuatanga	The spirit and spirituality
Tikanga	The right way, of the quest for justice
Manaakitanga	Care and support, reverence for humanity
Whānaungatanga	Belonging, reverence for the human person
Hohou rongo	Peace, reconciliation, restoration
Kotahitanga	Solidarity
Kaitiakitanga	Guardianship of creation
Te ao hurihuri	Change and tradition

The spiral form

It is worth noting here that a symbol of the enduring relationship of the source of life force (*mauri*) to its manifestation in reality is depicted in single and multiple spiral forms such as those used by Māori carvers. In his chapter on Māori art, Te Rangi Hiroa (1966) has a detailed section on curvilinear motifs and the double spiral. He describes five variations of the basic form which show

that the inner end of each spiral joins to the other and they proceed outwards to end points or that continue on at different tangents. We are also aware of many examples of double spirals of the "takarangi" type (Te Rangi Hiroa, 1966, p. 315) that have the outside ends bending to link with each other.

There are many references in the literature about the meanings of the double spiral. It is notable that they are usually allusive in quality and cover a broad range. For example, in a paper on a Māori understanding of the Church it is stated that "The double spiral symbolizes the unfolding of the cosmos…at it's core is neither space nor time and the unfolding of the universe begins" (A Māori understanding of Church: The double spiral, n.d.).

In this religious context, Io, the 'Supreme Being' (Henare, 2003) or God is seen to be at the core of the spiral/universe and the source of mauri, the energy or life-force. With the first moment of creation, this life-force unfolds over time and flows through every point of the spiral through space and time leading to "shape and form…bringing unity to all things". This concept of source and flow of energy is also applied to the source and flow of knowledge which similarly reverberates through the spiral/universe "…giving purpose and meaning to all things" (A Māori understanding of Church: The double spiral, n.d.).

Tresidder (2005) emphasises that the evolving continuity of the double spiral generally suggests a balance that is dynamic in that the movement outward remains referenced to the common core. Ultimately the movement turns inward and centripetal. He also refers to the effects of time where such continuity comes with the "cyclic rhythms of the seasons and of birth and death, the waning and waxing of the moon and the sun" (Tresidder, 2005, p. 448).

At lower levels, the spiral can symbolize the life of an individual as well as that of groups who are also part of the cycle of life, growth, decay, death and rebirth. There are also many references to the natural phenomena of life and growth, such as the unfolding of the fern frond, leading to the process of decay and returning to the soil with the emergence of new growth, in a continuous cycle. As cited by Thornton: "Ka mate he tete, ka tupu he tete…As one frond dies, another frond grows" (Thornton, 1959, p.42). In addition, Thornton also drew attention to the view that Māori carving patterns carried deep meanings that symbolised and referenced beliefs and principles.

As indicated, the spiral is a powerful and all-embracing symbol and reference for the Māori world. It symbolizes the unfolding of the cosmos from a core where there is neither space nor time. The source and flow of life-energy embraces the source and flow of knowledge; they reverberate through the universe and give purpose and meaning to all things. The dynamic cycles of life, growth, decay, death and rebirth are pervasive at all levels.

These symbolic interpretations of the spiral form are striking because there are similarities with key themes from contemporary physics. The work of Iberall and colleagues for example, advanced the doctrine of homeokinesis where the organisation of biological systems is seen in terms of cyclical behaviour and dynamical processes that seek stability and persistence (e.g. Iberall, 1970; Soodak & Iberall, 1978; Yates & Iberall, 1973). It is noted that cyclical behaviour is a general physical property of biological systems and that it is not imposed on the system from outside, but emerges from within. In the next section, we analyse a simple cyclical movement in a way that seeks to demonstrate parallels in the symbolic understandings from the Māori world and understandings from contemporary physics.

An example of convergence

Let us take the 'wiriwiri' as an example of cyclicity. It is a shivering-like motion of the hand and lower arm as it rotates slightly at the elbow, It is a part of many forms of Māori dance and is often used in oratory, chants, and waiata (singing). In this movement pattern, the hand moves in one

direction to a position in space and then moves back and it continues to repeat that motion. In this example, the force (which is produced by the forearm extensor and flexor muscles acting in synergy), steadily increases to a peak before decreasing to zero. As a result, the movements get bigger and faster to a maximum before becoming smaller and slower until the zero starting point is reached.

If we attach a potentiometer to the hand, to measure the change of position in space (known as 'displacement') we would get a series of increasing wave patterns like the red part of the displacement curves shown in the top half of Figure 1. From the maximum point, this waveform then decreases steadily as shown by the blue line to end at the zero or start position.

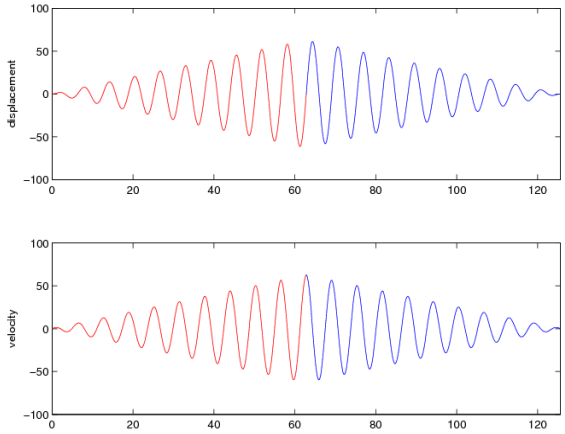

Figure 1. A model of the displacement and velocity wave forms for a movement that steadily gets bigger and faster to a maximum, then decreases steadily to return to the starting point

The speed or velocity of the movement pattern is derived from the displacement signal by a process called 'differentiation'. As seen in the lower half of Figure 1 it shows a steady increase in the speed of oscillations (red) and then a similar decrease (blue) to zero.

However, because these two different measures of phenomena (space/position and time/speed) are from a single movement pattern, they may be graphed against each other to see how their combined effects are manifested. When this two-phase plot is done, the result is the double spiral of Figure 2.

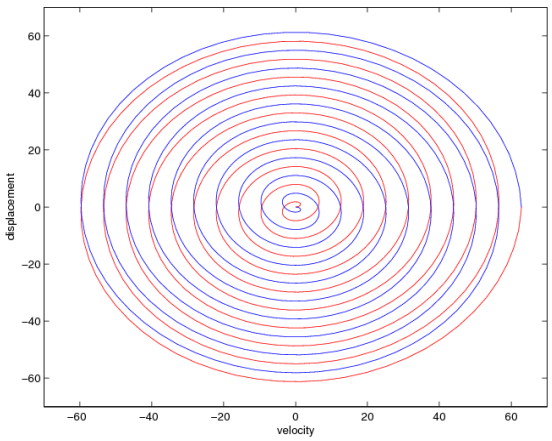

Figure 2. The double spiral pattern resulting from the displacement-velocity plot. The red line represents the increasing function out to a maximum and the blue line returns from the maximum to the starting point.

In Figure 2 we have velocity on the horizontal axis and displacement on the vertical one. The combined plot is a double spiral where the increasing spatio-temporal function is the red spiral going outwards and the decreasing function is represented by the returning blue spiral.

The fact that the double spiral shape can be produced by applying contemporary physics is interesting because that approach involves physical measurement and the specification of relationships between key elements in the dimensions of space, force and time. It also allows us to understand how the basic spiral effect can become modified as a function of changes in one or more of the variables. The role of a controlled source of energy is also highlighted.

The Māori world view also embraces these understandings; but in a more wholistic and non-metrical way. Its perspectives are more topological and rest on traditional principles and understandings that extend to dimensions of being that are beyond those of space, force and time.

Summing up the comparison

The aim of science is to produce confirmed theory about the key relations underlying phenomena so that leads to understanding, explanation, prediction and control. It has a set of principles that are designed to provide a conceptual basis and logic to investigation. It uses a reductionist approach with carefully determined methodology to gain power in testing propositions about relationships. The approach is typically highly specific and especially controlled and systematic.

The traditional way of knowing for Māori is not typically reductionist, it is totally expansive and wholistic. Mātauranga is knowledge, mohiotanga is understanding and māramatanga is enlightenment. Although the notions of prediction and control are present, they are part of a very broad scope—that of the world view encompassing a state of balance and harmony with all things, from the spiritual to the mechanistic and on a time scale that cycles continuously from the beginning to an end and back again. Yet like the method of science, it has a fundamental philosophy that results in sets of principles and values that serve to guide the knowledge process.

There is also a fundamental similarity because although the background and the methodologies are different, both approaches ultimately aim to solve problems to do with relationships between different elements of life. Both ways of knowing also include teaching and learning practices, where disciples undergo rigorous training. Both ways of knowing have well established communication systems; and although one is primarily semantic and the other is mainly oral and metaphorical, both are systematic and well-controlled.

These parallels indicate that there is a great deal of commonality between the scientific ways of knowing and the Māori one. Although the scientific method does not usually embrace metaphysical and spiritual matters, that is understandable because it seeks clarity and precision in its methodology. It is notable however that metaphysics and spiritual matters are part of the more general (non-scientific) way of seeking understanding. These more general ways of knowing usually include a mixture of the methods of tenacity, authority and intuition. The Māori world view is no exception in that sense, however, it clearly overlays its ways of knowing with a belief system that was established well before modern times. It seems quite natural really, for how else were people going to make sense of their very existence?

Towards the theory of spiral dynamics

It is noted that the present example used to study convergence is a relatively simple case of an oscillating movement. However, the feature of biological cyclicity is pervasive and goes far beyond the present ‘wiriwiri’ movement pattern. Indeed, if we model the set of principles for Māori

existence outlined earlier (*ritenga tangata*) in terms of the dynamics of the spiral form, a pattern like that in Figure 3 emerges.

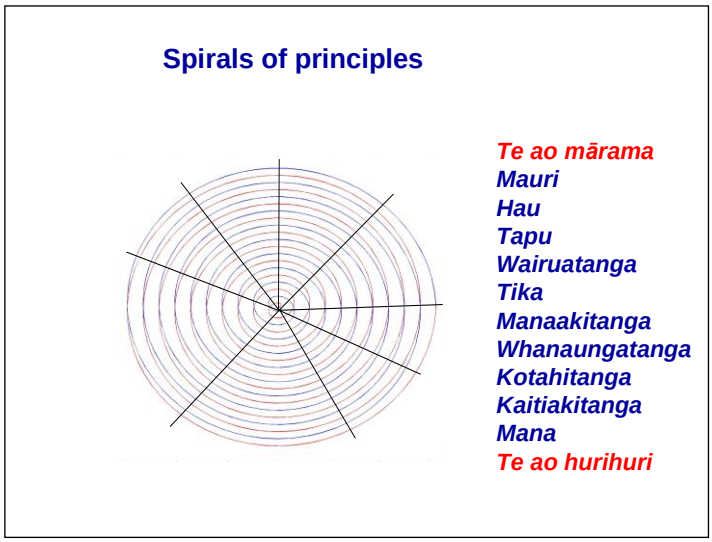

Figure 3. Spirals of principles leading to the world of enlightenment.

While it is tempting to try to locate each principle on a specific part of the spiral model, or to regard each as being represented by a vector, the challenge is to see these elements in a non-hierarchical manner. Such a view is necessary because the elements are interdependent and integrated; and they retain links with groups of other values that are important for the Māori view.

This approach brings us to a broader view of how human existence involves different levels of emergent cyclical processes. This dynamical approach made an impact on psychological theory with the work of Don Beck and Chris Cowan (1996) who extended the work of Graves (1974) and developed the theory of 'spiral dynamics'.

Spiral dynamics theory is a multi-disciplinary, multi-dimensional approach to understanding human nature. It embraces biological, psychological and social levels and is characterised by continual adaptation to environmental conditions. In this manner, new systems are formed while old ones are retained. Further, the systems of change are 'open' ones that permit continuous adaptation. While a deeper discussion of spiral dynamics is beyond the scope of this paper, it is notable that the spiral vortex is a particularly apt way to depict the ongoing emergence of human systems as they engage increasing levels of complexity. Each new turn of the spiral signifies this continuous elaboration of what is already present. As Beck and Cowan (1996) point out, the human spiral may be seen to be rather like a coiled spring of mindsets, values systems and world views. As a result, new minds and new ways of thinking continue to emerge. In the context of this paper, it has been argued that it is not surprising that different world views, languages and value systems can lead to different ways of understanding and describing phenomena.

It may be concluded therefore that there is a great deal of commonality and convergence when we compare the basic features and processes of scientific and Māori knowledge traditions. However, it is also clear that like the scientific method, the Māori knowledge tradition is characterised by a particular set of philosophies and principles that form a wholistic conceptual base and guide for coming to know, for coming to understand and for becoming enlightened. Learning about other cultural worlds is to do with respect and reciprocity; and in the broad context of the theory of spiral dynamics (Beck & Cowan, 1996), it promises further ways of knowing.

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Author Notes

Sincere appreciation is extended to Jason Turuwhenua for the technical production of the figures; and to Hōne Sadler, Dante Bonica, and Michael Walker for helpful discussions. We also acknowledge the reviewers for valuable comments that have added to the paper. An earlier version of this paper was presented by the first author in an open lecture at the celebration of Māori language week, Division of Sciences, University of Otago, Dunedin, New Zealand (21-28 July, 2008).

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