

The reductionist – holistic worldview dilemma

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Abstract: The dilemma for Māori scientists of holding a reductionist (scientific) worldview alongside a holistic (Māori) worldview can at times cause conflict. Yet, many believe that this internal quandary is actually a benefit. To facilitate better understanding of worldviews between Māori and scientists, the scientific and Māori worldviews are briefly outlined. The manner that these worldviews influence the ways we think about and experience the world will also be discussed.

Keywords: cosmology; holism; Māori; reductionism; science; whānau; worldview

For Māori scientists there is a dilemma. How does one hold a reductionist (scientific) worldview alongside a holistic (Māori) one? This could be likened to having a foot in each camp, because two very distinct and different worldviews are held. Needless to say there are times when conflict arises. Recently it has been suggested that holding these two worldviews, while challenging, is actually a benefit (Bohannon, 2007). Since open-mindedness is an asset in science, then the receptiveness to alternative approaches means Māori have the potential to make a unique contribution to science.

My vision is one in which Māori and scientists can work together to benefit whānau, hapū and iwi. One way to move toward this will be to understand each other's worldviews, both the differences and the similarities. In support, a recent paper made a recommendation that scientists wishing to build relationships with Māori should develop an understanding of Māori worldviews and cultural values (Cram et al., 2002). So this paper may be able to facilitate new insight and appreciation of worldviews between Māori and scientists through demonstrating the value of each worldview. As a member of both of these groups, I celebrate the diversity that holding both of these worldviews brings to my work. Thus to facilitate better understanding of worldviews between Māori and scientists, the scientific and Māori worldviews are discussed.

So why is it important to learn about worldview? Since worldview is a reference point for interaction with others, it is a foundation upon which research approaches and interpretations are constructed. Moreover, acknowledging the subjectivity of the worldviews that researchers hold is important, because the ways the world is understood and experienced influences research (Aluli-Meyer, 2008; Cajete, 2000; Marsden, 2003). Therefore to become conscious of the contribution that holistic and reductionist viewpoints bring to our ways of knowing and being is to become aware of how they shape our research.

Table 1 provides an overview comparing Māori and scientific worldviews based on origins of the universe, origin of species, views on spirituality, values and behaviours. It is not meant to be exhaustive but aims to summarise the concepts addressed in this paper. I use the terms scientific and reductionist worldviews interchangeably. Similarly, I use the terms holistic and Māori worldviews interchangeably.

Table 1: Comparison of Māori and scientific world views according to five operationally-defined categories. These concepts are outlined in the discussion.

Category	Scientific worldview	Māori worldview
Origins of the universe	The Big Bang bought matter into existence. The universe is still evolving in time and space.	3 processes bought the world into existence: Te Āo Korekore, Te Āo Pō, Te Āo Mārama.
Origin of Species	Different species evolved through genetic mutations and survival of the fittest	The children of Ngā Atua
Views on spirituality	Does not take into account the spiritual, mainly because it is not measurable.	Spiritual and physical worlds are not separate, but continuous
Values which are upheld	Objectivity, Scepticism, Rationale, truth	Whanaungatanga , Kaitiakitanga, Manaakitanga, Wairuatanga, Kotahitanga, Aroha, Tika, Pōno,
Behaviours	The scientific method: Systematic measurable investigation of phenomena	Rules of tapu Tikanga Māori

Holistic worldview

As noted in Table 1, the holistic Māori worldview is central to the ways that Māori experience and make sense of the world by shaping the kaupapa (values) and tikanga (codes of behaviour) that Māori live by (Mead, 2003; Royal, 2002). In addition, Māori values and ways of being are important because they underpin cultural well-being and are critical for Māori survival. In this way, when the Māori worldview is named as a holistic worldview, it is not dissimilar to other Indigenous worldviews. In recognition of Māori as part of a broader Indigenous world view, I have referenced Māori, American Indian and Hawaiian scholars in this paper. While the details may be different, the essential element of respect, reciprocity and responsibility with nature and spirituality is a common thread. Unfortunately, a consequence of colonisation is that while the holistic worldview is held by many Māori, it is not held by all Māori.

Māori cosmology is based upon a whakapapa (genealogy) of creation. This is especially significant because whakapapa informs relationships and is at the very core of what it is to be Māori (Te Rito, 2007; Walker, 1993). In addition, the literal translation of whakapapa is to build layers, so there are multiple layers, metaphors and interpretations that underpin Māori values and beliefs. Furthermore the layers of whakapapa create a link from the beginning of time through to the present and into the future (Williams, 2008). So complex concepts are not reduced or simplified, but are understood through their relationship to other things. A common strand however, is the holism of Māori cosmology. That is, the inherent connectedness and interdependence of all things through whakapapa.

The origin of the Māori universe begins with Io taketake, the creator and origin, then develops into the many phases of space describing Te Āo Korekore, the realm of potential being which represents a time of everything and nothing. Next came several periods of darkness called Te Āo Pō, when the loving embrace of Ranginui and Papatuanuku prevented any light from permeating into the world (Marsden, 2003). This was a time of struggle for their children, who became frustrated and decided to separate them. It was Tūmataunga (and in some versions Tāne) that finally separated his parents, allowing the dawning of a new age: Te Āo Mārama, the world of light and enlightenment, the world we live in

today (Hiroa, 1929; Marsden, 2003; Robinson, 2005). This was such an important period of time to Māori that it is almost always referred to in whaikorero (formal speech making): Ki te whaiao, ki te Āo Mārama... Tihei mauri ora! (Through the dawn into the world of light... Behold there is life!)

In Māori cosmology, the gods (ngā Atua) are the origin of species. For example, the offspring of Tāne, Tū, Tāwhiri, Tangaroa, Rōngo, Haumia (and some 70-odd others) eventually populated the universe with every diverse species known. Under this system, humans are related to both animate and inanimate objects, including animals, fish, plants and the physical environment (land, rocks, water, air and stars). Thus there is no separation between the physical and spiritual worlds; in the holistic Māori worldview they are continuous.

Moreover, in the holistic Māori worldview the relationship to whenua (the land) cannot be over emphasised. For example, right orientation or place, is firmly embedded in the Indigenous consciousness (Aluli-Meyer, 2006; Cajete, 2000; Deloria Jr, 1993; Royal, 2002). The physical connection anchors a Māori person geographically, to a mountain, a river, a place (or several depending on the number of iwi a person is linked to). This connection is constantly reaffirmed through various tikanga (ceremonial practices), such as the return of a child's afterbirth (also called whenua) and of koiwi (remains) to the earth which represents Papatūānuku's bosom (Mead, 2003). The afterbirth and the remains become a physical part of the landscape. Through eating plants and animals derived from the earth, the landscape literally nurtures and sustains a person (Cajete, 2000). The spiritual connection is an ancestral one. Māori say that they whakapapa back to their mountain and river, because we are all descended from Papatūānuku, the earth mother. It is all there in the pepeha (a formal introduction) which serves several purposes. The first purpose is to identify where a person is from geographically, connecting them physically to the land. Second, the identification of a person's iwi and waka (ancestral canoe) connects them to their people. Third, the spiritual connection empowers by bringing the tapu and mana of a person's mountain, river, tribe and ancestors. This is also reiterated in the name Māori call themselves: Ngā Tangata Whenua, the people of the land.

The Māori worldview is central to the ways that Māori experience and make sense of the world, because the values and behaviours that Māori live by are shaped by worldview (Mead, 2003; Royal, 2002). There are several values that are fundamental to Māori cultural practices including tapu (sacred and with restriction), wairuatanga (spirituality), whanaungatanga (kinship), kaitiakitanga (guardianship/stewardship), manaakitanga (generosity, hospitality), kotahitanga (wholeness or unity) (Durie, 2001; Henare, 1998; Marsden, 2003; Mead, 2003). Similar values are embedded in other Indigenous cultures (Cajete, 2000; Royal, 2002). These are not just values and principles, but also ways of being and ways of relating to others. Moreover, these values and ways of being also inform tikanga (Māori customary practices). Through the whakapapa of creation, tapu, wairuatanga, whanaungatanga, kaitiakitanga, manaakitanga, kotahitanga all have whānau at their heart. For example, tapu and wairuatanga are essentially about dignity and worth as a direct consequence of whakapapa to Ngā Atua (Shirres, 1997). Whanaungatanga (kinship) incorporates ways of relating to human family members, kaitiakitanga is about ways of relating to the environment and nature, manaakitanga is to do with of relating to guests and other people. Kotahitanga recognises how each individual's actions affects the collective (Marsden, 2003; Mead, 2003). Therefore, the holistic worldview acknowledges the sacred relationship that humans have with nature, with each other and with themselves. Practicing these ways of being recognises a key principle of holism, the interdependence of relationship to others. Intrinsic in this principle is how each little part affects the whole.

The reductionist worldview

In science, natural phenomena are understood by objectively creating and testing theories (Williams, 2008). The reductionist scientific worldview is central to this approach and the ways that scientists make sense of a complex world (an innate property of the mind). Reductionism reduces complex

systems into smaller parts in order to make sense of the complexity. In fact it was during the Age of Enlightenment that reductionism, rationality and liberalism emerged, an example of how science is deeply rooted in natural philosophy. With regard to the strong philosophical focus, there are parallels between the Māori and scientific worldviews. For example, knowledge is highly valued within Māori culture and Western science. For Māori this concept is embodied in whakataukī (proverbs) that explain the benefits of seeking knowledge (enlightenment, insight, wellbeing). There are also very clear whakapapa (genealogies) that outline the processes of thought (Marsden, 2003). Similarly, knowledge is held in high esteem in Western science. For example it was the philosopher Aristotle who first proposed that objects were made of matter. This and many of Aristotle's theories have been central to the development of biology, psychology and logic. Moreover, many of the founding fathers of Western science were also philosophers; for example, Galileo, Heisenberg, Newton and Einstein. In essence there are parallels between the traditional Māori approach to knowledge and Western science.

Another concept that scientists agree with Māori on is that the universe had a beginning. In the reductionist worldview the Big Bang was necessary for sustainable life to develop in this world. The Big Bang was the event that brought matter (anything that has mass and takes up space) into being (Hawking, 1988). This involved an enormous amount of heat and energy that produced the light elements hydrogen and helium, followed by extremely fast expansion and cooling forming the heavier molecules (Hawking, 1988). Thus, matter is evolving in time and space according to the universal laws of physics, the very same laws that existed at the beginning of time. Moreover the evolution of creation continues even today (Heisenberg, 1927). So another idea that Māori and scientists agree on is that the universe is a dynamic and ever changing entity.

In the Western Scientific worldview the origin of species occurred through Darwinian principles such as genetic mutations (random errors) and survival of the fittest. For example, changes in a living organism take place at a genetic level constantly, and when these mutations have an effect on a physical characteristic that is beneficial for survival, then nature selects in its favour. This is called natural selection (Darwin, 1859). Scientists generally believe that life was spontaneously generated, starting with simple life forms through to complex. Over millions of years, single-cell organisms evolved into multi-cellular forms, which in turn evolved into fish, then to reptiles, mammals, primates and finally humans (Hedges, 2002; King & Wilson, 1975). In this way phylogeny and taxonomy are the scientific equivalent of whakapapa.

A major difference between the Māori and scientific worldviews is that the current Western scientific worldview does not take the spiritual into account. This is likely to be a consequence of the separation of the church and science during the scientific revolution (Abrams, 1991). From then, the Western scientific cosmology was based upon empiricism.

In the same way that the Māori worldview shapes Māori values and behaviours, the scientific worldview shapes the values and behaviours of scientists. The specific behaviours that arise from this worldview are based on the scientific method in which systematic measurable investigation of phenomena is performed. This method allows theories to be constructed on the basis of observations, measurements and evidence. Inductive reasoning is used to formulate hypotheses from the observations, which are then tested experimentally. The theory is further refined and the process begins all over again.

The values which are upheld within the reductionist worldview include objectivity, rigour and logic. Objectivity permits reproducibility of results by avoiding cognitive and cultural biases while making measurements and/or interpretations. However, this view does not take into account the subjective experience which informs a persons' objective explanations of the world (Cajete, 2000). Neither does it take into account that science is an intensely human endeavour. While a large part of science may be analytical, creativity and open-mindedness are also required for developing hypotheses and interpreting data (Williams, 2008). Rigour is the determination that is required to perform the scientific method until a question is sufficiently refined and the answers have the fewest limitations. It

is also emphasises the replication of experiments as a method of validation. Logic involves critical thought and rationale. It is required to formulate hypotheses, to analyse and interpret data. This is necessary in science and reinforces that idea that science is centred on philosophy.

The reductionist worldview and the scientific method have made our lives easier. The scientific approach assisted us to progress from being hunter and gatherers through developing horticulture and agriculture. More recent scientific advancements have included electricity, plumbing, cars, aeroplanes and computers. So the progress brought about by scientific advances is tangible. Consequently, for the most part people support the scientific worldview. However, not all science is reductionist, some science is holistic; for example systems biology, chaos theory, homeokinetics and fMRI (functional magnetic resonance imaging). In contrast, spirituality is not so tangible, but it undeniably governs over much of what Māori and Indigenous peoples do, by informing ceremony and customary practices.

Imposing one worldview on the other is limiting, since each has strength. Rather we should revel in the diversity and richness of the different values that those worldviews bring. The insight that each worldview brings is very powerful. There is benefit in open-mindedness and mutual respect between Māori and scientists. Sir Apirana Ngata believed there was strength in integrating Māori values with Western approaches. This is embodied in his whakatauaiki, E tipu e rea which encourages Māori to grow and thrive by using the tools of the Pākehā to prosper, at the same time as cherishing the riches that lie in Māori culture and nurturing the spiritual (Cox, 1994). Conversely, scientists also recognise that there is a wealth of traditional accumulated knowledge in Māori and Indigenous cultures which is intimately bound to being in one place for many generations (Mazzocchi, 2006). So it makes sense that Māori and scientists should work together for mutual benefit, to broaden the horizons of understanding.

As a Māori scientist, I have benefited from the balance that holding both these worldviews has brought: the parallels and the paradoxes. I have learnt to appreciate both the sacred and profane, the theoretical and practical, the complex and simplified, the whole and all its parts. My own work has been enriched by these parallels and paradoxes. Because the brain is extremely tapu, I was cautious about whether I would be breaching any tapu restrictions by working with human brain tissue in my research about Huntington's disease (hereditary neurodegenerative disease). So my whānau and I visited our kaumatua to ask for permission. He told me that my iwi must decide this. What developed has by far been the most rewarding part of my work. My iwi has embraced my research and my research group. They have also emphasised the importance of using Tikanga Māori to keep me safe from harm's way. The process of learning more about tikanga Māori has brought a whole new dimension of awareness about identity, tapu, whanaungatanga, kaitiakitanga and wairuatanga.

In summary, the complementarity of having both Māori and Western worldviews to draw on has enhanced my research. Although there are differences in the reductionist and holistic worldviews, there are also similarities: the strong philosophical focus, the view of the universe as a dynamic and ever-changing entity, and the relationships between species (phylogeny to science, whakapapa to Māori). Synergy also exists between holistic and reductionist worldviews because Māori/Indigenous people and scientists share a thirst for knowledge that comes from the innate desire to make sense of and understand the world. Consequently, although the reductionist – holistic worldview dilemma does exist, the gap between Māori/Indigenous and scientific knowledge systems, it is not the giant crevice we might once have imagined. Rather I would prefer that the reductionist – holistic worldview dilemma be viewed as a bridge over the chasm of differences, which provides an opportunity for open-mindedness, mutual learning, new insight and appreciation of diversity.

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