# A dialectical approach to understanding the relationship between science and spirituality: The MODI model

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**ABSTRACT**

The MODI model is a dialectical way of comprehending the complementary relationship between science and spirituality. The model is founded on the notion that science and spirituality are domains of enquiry that both exemplify the values of modernity: open and embodied enquiry; the questioning of authority; and empowerment of the individual. The model captures the difference between science and spirituality by way of seven conceptual polarities: *outer-inner; impersonal-personal; thinking-feeling; empirical-transcendental; mechanistic-purposive; verbal-ineffable;* and *explanation-contemplation*. At the point where these dialectics overlap, the MODI model proposes an 'interface space' where science and spirituality overlap and combine. I further suggest that these seven polarities capture aspects of a fundamental 'head-heart' duality in human knowing, which is represented in a range of existing theories across philosophical, psychological and neurological levels. The model has predictive power and can help frame the growing interaction between science and spirituality that is a central feature of the contemporary world.

**KEYWORDS** Science, spirituality, dialectical, MODI model

## Introduction

My aim in this article is to present a dialectical model for understanding the complex relationship between science and spirituality. I will first contextualise the model in relation to the science-religion debate, as well as to key historical factors that have shaped the development of science and spirituality during the modern era. Then I will set out the key precepts of the model along with some predictions and implications for further study. (For a lengthy exposition of the model, see Robinson [2018]).

To commence, I will clarify how the term spirituality is defined in this article, and how it compares with religion. Religion and spirituality have much in common; they both cover topics such as the divine; the soul or 'true self'; states of consciousness; higher ways of knowing; enlightenment; sacredness; mystery; love; ecstasy; spiritual healing; yoga; meditation; and prayer (Fuller 2001). However, while religions explore these matters within the controls of (a) formal membership systems, (b) theology and liturgies, and (c) conventions and established rituals, spirituality by contrast refers to the *de-institutionalised* pursuit of these beliefs, practices and experiences (Adler 1905; Gottlieb 2012; Tacey 2004; Heelas and Woodhead 2005). Without the constraint of a religious hierarchy, spirituality is an open domain of inquiry through which a person can explore on their own terms or with others. Such openness comes with the benefits of being unconstrained by dogma or convention, but correspondingly can be rather uncontrolled and anarchic.

Spirituality and religion are often combined. Many liberal religious groups now accept the value of exploring spirituality and are open to their followers combining the practices and beliefs of their own religion with others taken from other traditions or from contemporary sources. However, an increasing number in the West now choose to explore

spirituality without having a religious affiliation (Mercadante 2014). The opposite is also true; some adhere to a religion but avoid spirituality (Shakespeare 2014).

Of the two, religion has been the focus of much more argument on how it relates to science, with literature running into hundreds of books and articles (Clayton 2018). In contrast, there is a notable lack of literature on modelling the science-spirituality relationship, with exceptions such as Charlton (2006) and Wallach and Reich (2005). An influential typological summary of the ways in which the science-religion relationship, which also applies in theory to the science-spirituality relationship, is provided by Barbour (2000). He devised a four-way typology of *conflict, independence, dialogue and integration.* The first of these, *conflict*, states that science and religion are rivals in competition for the truth, and that they make theoretical statements that are inherently incompatible. The second type is *independence.* This is the argument that science and religion are both true but have completely separate domains. Science and religion can co-exist peacefully if they respect their limits and stay true to their area. A well-known example of this scheme is the *Non-Overlapping Magisteria* (NOMA) model of science and religion developed by Gould (1999). Gould uses the analogy of oil and water – if oil and water are put in a jar, they create two distinct layers and do not mix, even at the join. That, says Gould, is how religion and science are; un-mixable.

Barbour's third approach is *dialogue*, which preserves the integrity of science and religion while focusing on commonalities in underlying assumptions, concepts, socio-cultural influences and methods. This argument emphasises that religion and science are institutions that are embedded in history and culture. So, science and religion that emerge from the same socio-historical milieu will show imprints of the underlying culture and this should create common ground for dialogue. The fourth type in the scheme is *integration*. This entails the search for a unified and internally coherent worldview that contains room for religion and science, by placing both within a singular rational scheme.

The MODI model that I present here includes elements of independence, dialogue and integration. With regards to *independence*, I will suggest that science and spirituality have different but complementary domains of focus, but also overlap considerably. With respect to *dialogue*, I will put forward the idea that science and spirituality have a harmonious relationship due to a common foundation in modern values of experience, progress and individual empowerment. With regards to *integration*, I will present an organising dialectical conceptual frame that allows science and spirituality to be conceived as parts of an integrated whole.

## Science and spirituality: Their common source in modernity

Foster Jones (1961) has martialed convincing evidence that the rise of modernity in Western culture can be traced to the mid-1600s. Modernity is a set of values and a worldview, founded upon the two interlinked beliefs that (a) the future can be superior to the past, hence progress is possible, and (b) individuals should be allowed to overturn tradition and innovate in order to help forge a better future (Armstrong, 2004). These beliefs had been around the fringes of the Western world for a century or more before the 1600s, embodied in renegade thinkers such as Copernicus and Da Vinci, but mainstream Western culture in the early 1600s remained anchored in the deeply held belief that human nature was in a period of senescence and decline, and that current society was a mere shadow of the perfections of the ancient past (Foster Jones 1961).

By the late 1600s, the modern belief in the importance of being progressive and rebellious became ever more widely adopted. Optimism was becoming normative. Science

was rising to cultural prominence at this time. The Royal Society was founded in England in 1663, with the subversive and sceptical motto of *Nullius in Verba*, which means 'Take Nobody's Word for It'. The Academie de Sciences was founded in France in 1665 with a similarly progressive and critical ethos. Newton's works in mechanics and optics in the 1680s provided evidence that science could develop important new truths and overturn traditional ways of knowing.

Spirituality found itself on a similar path of development at this time too. In the late 1600s, religion was undergoing spasms of change in response to the rising belief in modern values. Across Europe, religious socieities were breaking away from the Church to explore the spiritual life on new terms, motivated by a revolutionary spirit. These societies, such as the Seekers, Baptists, Muggletonians, Ranters, and Quakers, were spiritual in focus but were not recognized as religions at that time. In 1662, these movements were collectively labeled 'non-conformist sects' by an Act of Parliament. This provided an unintentional badge of recognition for their intentionally insubordinate ethos. Science and these new dissenting religions had much in common – they both spoke of progress and human betterment, of a world with greater rights for individuals, of more openness to innovation and change, and more trust in experience and reason (Hill 1991).

The Quaker movement ('*The Religious Society of Friends for Truth'*) was founded by George Fox in the 1640s. With no priests, no holy communion that involves wine and bread, no set theology, and no churches, it is hard to imagine a more radical reinterpretation of Christianity. The Quaker belief that religion is internal to people's hearts and souls, rather than an external membership to a group, was a clear step toward de-institutionalised spirituality. The seventeenth century also saw the rise of mystical religious movements in continental Europe, including the Pietists in Spain, the Behmenists who followed the mystic Jacob Boehme, and the Rosicrucians in Germany and England. Like the Quakers, these movements emphasized experience as a path to spiritual truth, over and above the authority of scripture and faith.

These mystical and non-conformist movements of the 1600s provided a foundation upon which non-religious spiritual movements such as Romanticism, Transcendentalism and New Thought were built. These movements were highly influential through the late 1700s and 1800s, acting to move culture forward in new spiritual directions that were premised on experience, art, and the possibility of latent human potentials. Many of the subsequent modern movements in spirituality coincided with further scientific revolutions. (For more detail, see Robinson [2018]).

In summary, science and spirituality both developed as expressions of the modern values of progress, questioning, innovation and individual empowerment. This shared source is still expressed in commonalities of practice today. Firstly, both are premised on the importance of *action* as a basis for knowing. Doing science or spirituality (as opposed to just reading about them) is achieved by undertaking particular kinds of embodied activity over an extended period, after receiving the right kind of training. By pursuing these methods, and by accepting a fair amount of trial and error, the assumption in both science and spirituality is that a practitioner will develop a more accurate conception of reality, and so move closer to the truth and further from falsity (Ravindra 2001). For the scientist, the embodied activity that is necessary is data collection from the external world, *via* traveling to the data collection site; gathering field notes; taking measurements; making observations; and specimen-gathering. For the spiritual practitioner, the practices used to facilitate development include meditation; yoga; tai chi; centering prayer; dance; singing and playing music; psychotherapy; exploring states of consciousness; as well as ethical activism and 'helping' activities, such as charitable work or caring for the sick.

A second key commonality across science and spirituality is that they both emphasise reflective questioning, criticality and a wariness of dogma. Within science, critical thinking is highly valued. Scientists are encouraged to self-criticize too, and to reflect constantly on limitations and ways of improving their methods and theories. The reflective and critical processes of spirituality are more informal than those of science, but no less important. Mature spiritual questioning entails reflecting on whether what is being experienced or learned *via* one's practice is congruent with reason and intuition, and helpful to personal and social development. Critical reflection is further facilitated by talking to others and by perusing the ever-expanding literature on spirituality (Gottlieb 2012; Rowson 2014).

## The MODI model

MODI stands for *Multiple Overlapping Dialectics*. As discussed in the previous section, the MODI model is founded on the basis that science and spirituality have foundational attributes in common: individual empowerment; embodied knowing; optimistic progressivism; and open enquiry. Given that they have these values in common, they are well placed to forge a harmonious relationship. On this foundation, the model presents science and spirituality as different, indeed as opposite, in a range of important ways. These differences can be conceived by way of the following seven dialectical polarities:

1. Outer—Inner
2. Impersonal—Personal
3. Thinking—Feeling
4. Empirical—Transcendental
5. Mechanism—Purpose
6. Verbal—Ineffable
7. Explanation—Contemplation

Dialectical thinking is a way of thinking with opposites that goes back thousands of years to Heraclitus in the West and to early Oriental philosophies such as Taoism. It avoids the faulty assumptions that (a) opposition between two ideas means conflict between them, and (b) that there is no possible middle ground where opposites can meet (what Aristotelian logic refers to as the *excluded middle*). Rowan (2000) refers to how dialectical thinking conceives of opposites as interdependent, inter-penetrating, and unified. He illustrates this by way of an analogy of light and dark. You cannot have light with dark (interdependence), every darkness contains some light and *vice versa* (interpenetration), and ultimately light and dark are part of the same singular polarity of illumination (the unity of opposites).

Each of the seven polarities in the MODI model, when conceived dialectically along the lines that Rowan proposes, provides a helpful yet partial basis for conceiving the distinction between science and spirituality. In Robinson (2008), I discuss each of the seven polarities in detail. Here, I provide a summary of each polarity in Table 1.

INSERT **TABLE** 1 HERE

When viewed as a whole, the seven polarities build up to an integrated and unified picture, like the old Indian proverb of the blind men all touching different parts of an elephant and discussing what they each feel to together build up a composite image of the whole animal. In Figure 1, I use a mandala structure to present the integrated picture that the model provides. Mandalas are based on a symmetrical arrangement of geometric forms around a central point. They have been used across cultures and eras to depict coherence, harmony, wholeness and balance. Jung studied the use of mandalas in religion, mysticism and dreams, and concluded

that they are powerful archetypal depictions of wholeness through the balance of opposites (Jung 1995). Figure 1 depicts the wholeness and balance of opposites that emerge from placing the seven dialectics together within a singular visualisable frame. When the polarities are arranged in this way around a point, a 14-sided tetradecagon shape is created, and the space within the shape represents the range of human knowing that the open-minded seeker of truth can explore. The epistemology that underlies the MODI model is dual-aspect monism, which posits that while all knowing is ultimately part of a singular integrated reality, human beings grasp this singular reality in two different ways.

INSERT **FIGURE** 1 HERE

The left side of the model comprises seven terms that capture key features of science: a focus on outer reality and publicly available facts; an impersonal and detached mode of inquiry; the use of empirical evidence; rational and analytical thinking; mechanistic explanation; knowledge conveyed in numbers and words; and generalized explanation.

The right side of the MODI model contains the opposites of the seven key features of science, which are core characteristics of spirituality. Spiritual practice and knowing emphasize the depth of the inner life; cultivating personal *I-Thou* experiences with other conscious subjects and/or the divine; exploring the transcendental and mysterious; cultivating and appreciating deeply-held feelings and intuitions; embracing forms of nonverbal knowing; ineffable truths that belie language; and the merging of subject and object in contemplation.

This way of distinguishing science and spirituality is a matter of degree rather than absolute. While the methods and activities of science have an emphasis on the left-hand side concepts, and spirituality has an emphasis on the concepts listed on the right-hand side, both draw on the alternative side, albeit to a lesser degree.

The two sides of the figure are separated by a dotted line, which represents the permeable division between science and spirituality, across which there is constant give-and-take. Also, around the central point is a circle labeled *interface space* (See Figure 1). This is the place that these seven dialectics meet, and in which science and spirituality mingle and combine into hybrid forms. It is here that we find mindfulness research; transpersonal psychology; parapsychology; noetic sciences; the study of spiritual experience and sacred geometry, amongst many other science-spirituality hybrids.

## The two sides of the MODI model: Parallels with other theories

The left-right duality of the MODI model shows parallels with a number of other theories at philosophical, psychological and neurological levels of analysis. I contend that the similarities across these levels of analysis point to a fundamental or archetypal two-ness in human knowing that has traditionally been known in the West as head knowing and heart knowing (Porter 2006). The science-spirituality relationship as conveyed in the MODI model echoes and mirrors this enduring distinction.

### *Parallels with spiritual philosophical theories*

The first parallel is to Chinese yin-yang philosophy. In this philosophy, the balance of yin and yang in key to a healthy life. Yang relates to the left of the MODI model – it is knowledge based on rationality; assertion and dominance; explicit propositions; visible things; solid objects; and external reality. It is represented by the metaphors of light and sun, and by masculinity. In contrast, yin equates to the right side of the MODI model – it relates to knowledge based on feelings; intuition; ineffable gnosis; the unconscious; and being

receptive to transcendental or hidden influence. It is represented by images of shade, night and the moon, and by femininity (Xinyang 2013). A famous visualization of yin and yang is the taijitu (see Figure 2). Yin is the black side and yang is the white side. The two opposite-colour dots within each side represent how each side contains its opposite. The singular wholeness of the image represents the primal oneness of reality or knowledge, variously called *taiji* or *wuji*.

INSERT FIGURE 2 HERE

The second parallel is to Western alchemy - another spiritual philosophical tradition that distinguishes two complementary archetypal principles. To pursue the spiritual path of alchemy, the practitioner must learn to embody and integrate the opposites of *Sol* and *Luna* (Jung 1963). *Sol* refers to rational knowledge; external focus; methodical planning and thinking; and reflects the left side of the MODI model. *Luna* refers to mystical knowing; feelings; personal connection; and unconscious influence, and links to the right side of the MODI model. A graphic depiction of *Sol* and *Luna* as the two sides of the alchemical journey is provided by way of the Azoth Mandala, developed in the Middle Ages to visually represent the alchemist's journey, and reproduced by Dennis Hauck (1994) (See Figure 3). On the right side, Luna is represented by the moon and also a woman sitting atop a fish, which represents her connection with the natural world. On the left side, *Sol* is represented by the sun, a torch symbolising the light of rational knowledge, and a king sitting on top of a cave containing a dragon (Hauck n.d.). The dragon represents the contents of the unconscious, which *Sol* tries to subdue. In alchemy, the individual who achieves a sacred marriage of these two principles becomes whole and transforms into a higher form of person.

INSERT FIGURE 3 HERE

## *Parallels with psychological theories*

Three theories of cognition refer to two systems of knowing that show parallels with the MODI model. The first is the theory of *separate knowing* (SK) and *connected knowing* (CK) (Belenky *et al*. 1988). Separate knowing is characterized by a distanced and impartial stance toward the topic or person that one is trying to know, whereas connected knowing is characterized by entering into a deep connection or empathic resonance with the other person or the idea that one is trying to know. Galotti *et al*. (1999) developed a questionnaire for measuring SK and CK that shows reliable gender difference, with males showing a preference for SK and females showing a preference for CK (Galotti *et al*. 2017).

The second pertinent two-fold distinction is provided by the theory of Farley and Reyna, which postulates two information-processing systems – the *analytical* and *intuitive* systems (Reyna and Farley, 2006). The analytic system is slow; effortful; explicit; serial; controlled, capacity-limited, and related to IQ-based cognitive ability. The intuitive system is fast; automatic; associative; high capacity; parallel; and is uncorrelated with cognitive ability (Farley and Reyna 2007). There is also a gender difference between these two systems, with women using the intuitive system more (Sadler Smith 2011).

The third relevant distinction is the *Interacting Cognitive Subsystems* theory of Teasdale and Barnard (1993). This theory distinguishes two systems for generating meaning; the *propositional* and the *implicational*. The propositional subsystem finds meaning using logical and serial ordering of propositions, and codes information verbally. In contrast, the implicational system is responsible for emotional responses. The meanings it produces are holistic, embodied, latent and non-verbal. It communicates in overall gist. If these two

systems work in harmony, it is argued that they lead to order and health. Imbalances are said to lead to cognitive-emotional difficulties and disorders (Barnard 2009).

Looking across all three theories, it is apparent that the left side of the MODI model has clear conceptual parallels with (a) separate knowing, (b) the analytical system and (c) propositional meaning. All refer to the process of knowing through impersonal, objective detached, analytic, rigorous thinking. In contrast the left side of the MODI model shows parallels with (a) connected knowing, (b) the intuitive system, and (c) implicational meaning, all of which are personal, empathic, emotive, holistic and contemplative.

### *Parallels with neurological theory*

McGilchrist (2012) has collated research on the key functional differences between the brain's two cerebral hemispheres. In terms of attention, the left hemisphere focuses on parts and separate objects, while the right hemisphere has a global form of attention that attends to wholes, patterns and connections. In terms of perception, the left hemisphere sees things through labels, concepts and categories, while the right hemisphere sees connected systems and wholes composed of interconnected elements. The left hemisphere attends to whatever is inanimate, mechanical, impersonal or machine-like, while the right hemisphere is personal, flexible, organic and empathic. McGilchrist argues that the brain's hemispheric split represents two fundamental ways of experiencing the world. Facilitated by the right hemisphere, the *holistic* way of knowing experiences the world as a seamless whole in flux, without the discrete labels of language and rationality. In contrast, the left hemisphere supports an *atomistic* way of knowing and paying attention, which divides the world into parts, conceptualizes it into abstractions, and focuses narrowly on particular parts.

There are clear parallels between the functions of the two cerebral hemispheres and the sides of the MODI model. Both the left side of the brain and the science-focused left side of the MODI model are focused on impersonal, abstract, uninvolved, unemotional, factual information, and tend to be reductionist and mechanistic. In contrast, both the right hemisphere of the brain and the right side of the MODI model are personal, particular-focused, holistic, emotional and aesthetic. Fitting with this, McGilchrist (2011) is explicit that the right hemisphere is more attuned to spirituality than the left.

In summary, there are various precedents in philosophy, psychology and neuroscience for the idea of two complementary ways of knowing that make up a larger whole when combined harmoniously. This provides a meta-theoretical justification for the MODI model. The central implication of this discussion is that science and spirituality are expressions of two fundamental forms of human knowing and human being. Neither one of these two is superior to the other; they are like partners in a dance, acting to counterbalance the other and so create an overall harmony. When science detaches from the aptitudes and practices that define spirituality, it can easily become overly mechanistic, rationalistic and arrogant. Conversely, when spirituality detaches from the values of science, it can become credulous and gullible (Vradenburg 2007).

## Predictions and implications

From the MODI model's precepts, a number of testable predictions can be made. First, any textual analysis of books on science and spirituality using software such as *Linguistic Inquiry and Word Count* will find a comparative differentiation of terms across the two forms of text that fit with the polarities presented in Figure 1. Second, any textual analysis of any documents that inform training in science or spirituality would find the same comparative distinctions. Third, individuals who are nominated by others as exemplars of wise and mature

adult functioning will show a balance of activity and interest across the two sides of the MODI model relative to a matched control, while individuals showing evidence of disorder may represent imbalance across the two sides. Fourth, balance across the two sides of the model should increase with life experience and age.

In order to test these predictions, it will be necessary to devise an instrument for measuring interest in, and involvement in, the twin ends of the seven polarities. It is my intention to create one as the next step in my work in this area. This brings me to the final prediction, which is that the instrument that will be devised to test the MODI model will show robust gender differences, with more females than males interested in ways of knowing that emphasise the ends of the polarities on the right hand side, and more males interested in ways of knowing that emphasise the left. This will fit with the aforementioned other theories, and also existing research on gender differences in science and spirituality (Heelas and Woodhead 2005; Penner 2015).

## Growing interaction

In the MODI model, the idea of the *interface space* is used to convey the territory in which science and spirituality interact and overlap. This space has become increasingly populated since the 1960s, due to a growing interaction between science and spirituality. Organisations such as the Scientific and Medical Network (SMN), Science and Non-Duality (SAND) and the Institute of Noetic Sciences (IONS) have arisen since in the 1970s to explore this interface space. The British Association for the Study of Spirituality (BASS), founded in 2010, also provides a forum for discussions that overlap science, philosophy and spirituality.

I propose that this growing interaction may have been stimulated by the growing postmodernist impulse since the 1960s, which despite its many shortcomings as a philosophical paradigm has stimulated the mixing of different paradigms and frames of cultural reference, including spiritual and scientific ones. This integration of science and spirituality may be an example of what postmodernists refer to as *bricolage* – the creating and mixing of texts and paradigms to derive new modes of thinking and seeing (Altglas 2014). This postmodern love of mixing contrasts with modernity's clear preference for separate academic silos and distinct domains of enquiry and expertise (Wilber 2000).

The field of transpersonal psychology has been another important forum for the interaction of science and spirituality. It was founded in the mid-1960s to further the theoretical and empirical study of spiritual experiences and spiritual development. The British Psychological Society still has a dedicated transpersonal psychology section, and there are a number of other organisations that represent this important boundary-crossing domain of psychology, including the Association for Transpersonal Psychology. An outgrowth of this movement has been integral psychology, and integral studies. Meanwhile, ways of being scientific and evidence-based about spirituality have been increasing in popularity and prevalence across psychology more generally (Vaillant 2008). As an example of this, the American Psychological Association brought out the journal *Spirituality and Clinical Practice* in 2014, having previously been averse to referring to spirituality at all.

The crossing over of science and spirituality is by no means uncontroversial – when science is pointed toward spiritual matters, it moves into territory that is much harder to evidence using its preferred forms of external data (Charlton 2006). Similarly, spirituality can easily be turned into an intellectualised word game if it only pursued in the context of the evidence-base and rational schemes typical of the interface space. Such an apparent dilution of the respective strengths of science or spirituality is anathema to those who want to keep them apart, but a strategy of apartness is no longer tenable in a world where all human

activities, including scientific and spiritual ones, are now intricately interconnected. Modernity achieved much by separating human knowledge into discrete domains of expertise, but that silo-based approach is reaching the end of its tenure. What is now needed is a more integrated conceptualisation that avoids attempts to blur the important distinctions between science and spirituality, while providing a rubric for comprehending healthy interaction between the two. I contend that the MODI model can provide this much-needed framework.

## Notes on contributor

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## References

Adler, F. (1905). *The Essentials of Spirituality*. New York: James Pott & Co.

Altglas, V. (2014*). From Yoga to Kabbalah: Religious Exoticism and the Logics of Bricolage.* New York: Oxford University Press USA.

Armstrong, K. (2004). Fundamentalism and the secular society. *International Journal, 59*, 875-877.

Barnard, P.J. (2009). Depression and attention to two kinds of meaning: A cognitive perspective. *Psychoanalytic Psychotherapy, 23*, 248–262

Barbour, I. (2000). *When science meets religion*. San Francisco: HarperSanFrancisco.

Belenky, M.F., Clinchy, B.M., Goldberger, B.M., & Tarule, J.M. (1988). *Women's ways of knowing: The development of self, voice and mind.* New York: Basic Books.

Charlton, B.G. (2006). Despite their inevitable conflicts – Science, religion and New Age spirituality are essentially compatible and complementary activities. Medical Hypotheses, 67, 433-436.

Clayton, P. (2018). *Religion and science: The basics. 2nd Edition*. London: Routledge.

Clinchy, B.M. (1996). Connected and separate knowing; Toward a marriage of two minds. In N.R. Goldberger, Tarule, J.M., Clinchy, B.M. & Belenky, M.F. (Eds.), Knowledge, Difference, and Power; Essays inspired by "Women's Ways of Knowing" (pp. 205-247). New York, NY: Basic Books.

Farley, F. & Reyna, V.F. (2007). Is the teen brain too rational? *Scientific American*. Retrieved from https://www.scientificamerican.com/article/is-the-teen-brain-too-rational/

Foster Jones, R. (1961). *Ancient and Moderns: A Study of the Rise of the Scientific Movement in Seventeenth-Century England*. Dover Publications.

Fuller, RC (2001) *Spiritual but not Religious: Understanding Unchurched America*. Oxford University Press.

Galotti, K.M., Clinchy, B.M., Ainsworth, K.H. et al. (1999). A New Way of Assessing Ways of Knowing: The Attitudes Toward Thinking and Learning Survey (ATTLS). *Sex Roles, 40*: 745. https://doi.org/10.1023/A:1018860702422

Galotti, K.M., Schneekloth, M.J., Smith, A.P., Bou Mansour, C., & Nixon, A.L. (2018). Ways of knowing and appraisal of intellectual activities. *American Journal of Psychology, 131*, 53-63.

Gottlieb, RS (2012). *Spirituality: What It Is and Why It Matters*. Oxford University Press.

Gould, S.J. (1999). *Rocks of Ages: Science and Religion in the Fullness of Life*. London: Jonathan Cape.

Hauck, D.W. (n.d). *The Azoth Ritual*. Retrieved 10th December 2019 from www.azothalchemy.org/azoth_ritual.htm

Heelas, P. & Woodhead, L. (2005). *The Spiritual Revolution: Why Religion is Giving Way to Spirituality*. Blackwell Publishing.

Hill, C. (1991). *The World Turned Upside Down: Radical Ideas During the English*

*Revolution*. London: Penguin.
Jung, CG (1963). *Mysterium Coniunctionis: An Inquiry into the Separation and Synthesis of Psychic Opposites in Alchemy*. Routledge.
Jung, CG (1995). *Memories, Dreams, Reflections*. New York: Flamingo.
McGilchrist, I. (2012). *The Master and His Emissary: The Divided Brain and the Making of the Western World*. Yale University Press
McGilchrist, I. (2011). *Can the divided brain tell us anything about the ultimate nature of reality?* Royal College of Psychiatrists. Retrieved from: https//www.rcpsych.ac.uk/pdf/Iain%20McGilchrist%20Can%20the%20divided%20brain%20tell%20us%20anything%20about%20the%20ultimate%20nature%20of%20reality.pdf
Mercadante, LA. (2014) *Belief without Borders: Inside the Minds of the Spiritual but not Religious*. Oxford University Press.
Ravindra, R. (2001) *Science and the Sacred*. Theosophical Publishing House.
Reyna, V. F., & Farley, F. (2006). Risk and Rationality in Adolescent Decision Making: Implications for Theory, Practice, and Public Policy. *Psychological Science in the Public Interest*, *7*(1), 1–44. https://doi.org/10.1111/j.1529-1006.2006.00026.x
Robinson, O.C. (2018). *Paths Between Head and Heart: Exploring the harmonies of science and spirituality*. London: O Books.
Rowan, J. (2000). Dialectical thinking and humanistic psychology. *Practical Philosophy*. Retrieved from http://www.society-for-philosophy-in-practice.org/journal/pdf/3-2%2020%20Rowan%20-%20Humanistic%20Psychology.pdf
Rowson, J. (2014). *Spiritualise: Revitalising spirituality to address 21st century challenges*. RSA Publications.
Sadler-Smith E. (2011). The intuitive style: Relationships with local/global and verbal/visual styles, gender, and superstitious reasoning. *Learning and Individual Differences, 21*(3), 263–270. doi: 10.1016/j.lindif.2010.11.013.
Shakespeare, T. (2014). *Is it better to be religious than spiritual*? BBC Magazine, retrieved 2nd Jan 2020 from https://www.bbc.co.uk/news/magazine-27554640
Tacey, D. (2004) The Spirituality Revolution: The Emergence of Contemporary Spirituality. London: Routledge.
Teasdale, J.D., & Barnard, P.J. (1993). *Affect, cognition and change: Re-modelling depressive thought*. Hove: Lawrence Erlbaum Associates.
Vaillant, G. (2008) *Spiritual Evolution: A Scientific Defense of Faith*. New York: Broadway Books.
Vradenburg, G. (2007). Science and spirituality working together. *Tikkun, 22*(6): 8.
Wallach, H. & Reich, K.H. (2005). Reconnecting science and spirituality: Towards overcoming a taboo. *Zygon, 40*, 423-442.
Wilber, K. (2000). *The Marriage of Sense and Soul*. Boston: Shambhala Publications.
Xinyan, J. (2013) "Chinese Dialectical Thinking – The Yin Yang Model." *Philosophy Compass, 8/5*, 438–446.

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Figure 1. The Multiple Overlapping Dialectics (MODI) model of science and spirituality

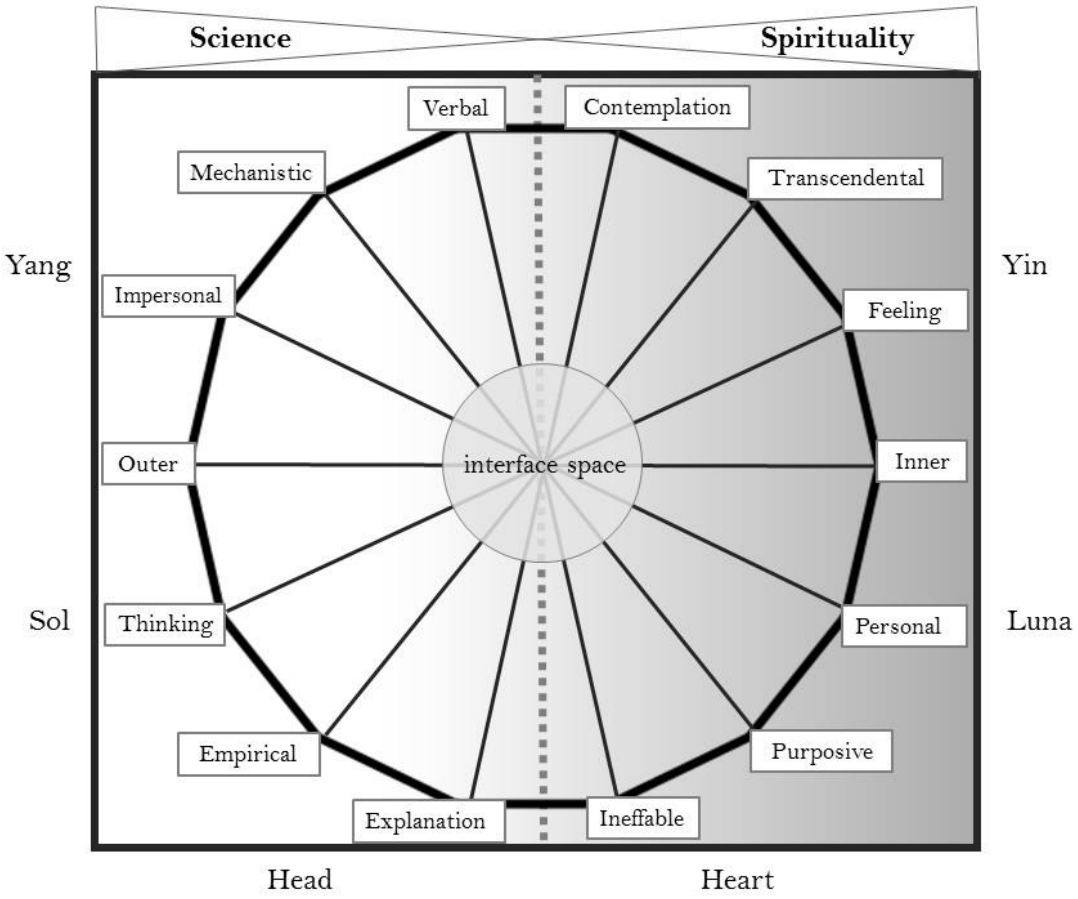

Table 1. The seven dialectical polarities of the MODI model, and key thinkers associated with each one

| Feature of science | Feature of spirituality |
|---|---|
| **Outer knowing**<br>Scientific knowing is based on evidence from the external world gathered *via* naturalistic observations or controlled experiments. It is this recourse to the outer world for its data that give's science replicable and reliable evidence. For psychology and the social sciences, inner phenomena must be turned into outer phenomena for the purposes of being used as evidence. | **Inner knowing**<br>A central theme within spirituality is the notion of a 'deep within', and the possibility of knowing inwardly things that cannot be verified publicly. Subjectivity is not a source of bias in spirituality but as a rich domain of investigation, and techniques for refining first-person conscious experience and that reveal its deeper contents, are key to spiritual practice. |
| **Impersonal encounter**<br>Science aims at an "I-It" impersonal account of the world and universe. Impersonal knowing de-emphasises the observer and their interpretive role. It aims to keep subject and object separate such that an account of the latter is not overly reliant on the particularity of the former. This impersonal aspiration for knowing is referred to as a *view from nowhere*, as it aims at descriptions and laws that apply across all times and places. | **Personal encounter**<br>A focus within spirituality is learning to cultivate a sense of personal 'I-Thou' connection with the divine, the universe, with the earth and with other living beings. This involves a deep interaction of subject and object, such that two merge into one within a relationship, in contrast to the distancing of the I-It encounter, where the object and subject are kept apart as far as possible. The apotheosis of the impersonal encounter is objectivity and truth, while the apotheosis of the personal encounter is caring and love. |
| **Cultivating thinking**<br>The process of science is intricately reliant on rational and logical thought to (a) frame research questions and hypothesis, (b) design empirical studies, (c) conduct an analysis of data, and (d) develop theories. Scientists receive years of training in how to engage in this kind of rigorous thinking, as well as in critical thinking. Although feeling is recognised as important to scientific insight, there is no training in cultivating such feelings for scientists and usually no mention of feeling in scientific writing. | **Cultivating feeling**<br>A common value in spirituality is the importance of feeling to (a) certain kinds of knowing, and (b) finding meaning in life. Deeply felt intuitions, gut feelings and "gnostic" forms of knowing can be cultivated through practices that deepen awareness beyond verbalised thought. The goal of lessening suffering, which is common across most forms of spirituality, focuses on overcoming the pain attached to particular kinds of feeling, i.e. fear, anger and sorrow, while developing a capacity for equanimity and/or joy. |
| **Empirical focus**<br>Central to the scientific method is the acquisition of data through the senses, with a particular focus on vision. Even when scientific instruments collect data from levels of physical reality that are invisible, *e.g. via* an electron microscope or a particle accelerator, the data must be translated into some form that can be conveyed from the outside world through the sensory nervous system to the brain. | **Transcendental focus**<br>While much of spirituality is focused on the immanent world, one important part of its remit is to explore, through experiential means, whether there is a reality (or realities) that are beyond the capacity of the senses and scientific instruments to convey, and whether a connection can be made to this wider reality by means such as meditation, prayer, channelling, mediumship, divination, visions or other. |

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| **Verbal knowledge**<br>Scientific knowledge must always be encoded in words and numbers to enter the corpus of scientific literature. Mathematics is a form of language – it uses symbols and signs, and rule to combine these, to represent the quantitative aspects of reality. Science is thus ultimately and always reliant on the power of language to convey knowledge about the world. | **Opening to the ineffable**<br>Mystics have, for thousands of years, conveyed that language is limited and that the most profound human experiences lie beyond the capacity of words and numbers to convey, i.e. are ineffable. Spiritual practices are often focused on moving the mind beyond language, and verbalised thought, through cultivating silence or ways of representing reality wordlessly, for example through meditation, art and music. |
| **Understanding mechanism**<br>The word mechanism comes from the Greek word *mekhanos*, meaning "means" or "cause". Science's emphasis on mechanism reflects its historical focus on the study of lawful movement and change in physical systems. In Aristotelian terms, this means it focuses on *efficient* and *material* causes, and a preference to avoid talk of *final* causes. When one asks 'how' something happens, one is asking for a mechanistic response, i.e. the process of change that brought it about. This is generally science's preferred mode of accounting for phenomena. | **Grasping ultimate purpose**<br>While science has tended to avoid matters of purpose and whether or not there is a direction or telos to the universe and the human condition, spirituality has ensured that such matters remain live topics of discussion in the modern world. It discusses divination, destiny, fortune, ultimate goals, and practices that explore feeling *called* towards particular goals or projects, i.e. have a sense of vocation. It explores the idea of a sense of purpose that may be driven by higher values but is unique to the person, as opposed to the more generic purposes of religious systems. |
| **Explanation**<br>Explanation seeks to find the cause or reason for a phenomenon, by looking into the past for possible causes, or for a logico-mathematical law or principle that might explain or govern it. Explanation is at the heart of scientific knowing. The Latin root of the word explanation is *ex planus*, which means 'to spread out'. This reflects how in the explanatory mindset attention spreads outward and away from a phenomenon, to seek out causes, laws and reasons for why it is as it is. | **Contemplation**<br>Contemplation involves sustained attention towards an object or image and immersing oneself fully in the experience of it. This requires being in the present moment and placing attention as fully as possible on that which is contemplated. This, in turn, means not endeavouring to explain it. The Latin root of contemplation is com-templum, which means 'together in the sacred place.' This reflects how the perceiver and the perceived come together in the act of contemplation within a higher unity. |

Figure 2 The Taijitu: A visualization of yin-yang as both two and one

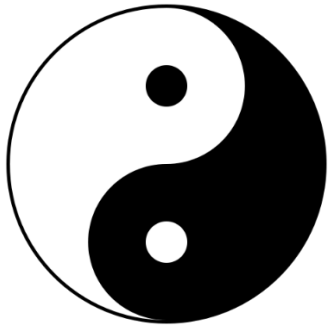

Figure 3 The Azoth Mandala of Alchemy