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**REVIVING THE SPIRIT IN THE PRACTICE OF PEDAGOGY:  
A SCIENTIFIC PERSPECTIVE ON INTERCONNECTIVITY  
AS FOUNDATION FOR SPIRITUALITY IN EDUCATION**

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## ABSTRACT

This thesis is a response to the fragmentation prevalent in the practice of contemporary Western pedagogy. The mechanistic paradigm set in place by the advance of classical science has contributed to an ideology that places the human being in a world that is objective, antiseptic, atomistic and disjointed. As a result, education has largely become a practice in which the learner is encouraged to identify with, and "successfully" live according to, a world that is competitive, materialistic, lonely and devoid of any spiritual dimension.

This paradigm is presently being challenged by recent developments in the sciences, from physics to biology. The vision emerging recognises the universe as holistic and fundamentally interconnected. Moreover the idea of interconnectivity is seen as the key to a richer understanding of both matter and consciousness. Seeking out expressions of such interconnectivity in education offers a space in which learners can identify the self with an extended context of life. With the knowledge that one's individuality exists by virtue of its relationship to a larger community, the learner may begin to experience the self and the world in a way that is more whole and more meaningful. The philosophy of science discussed in this thesis offers a language where the spirituality of education may be reclaimed.

## RÉSUMÉ

La présente thèse se veut une réponse à l'aspect fragmentaire caractérisant la pratique de la pédagogie contemporaine occidentale. Le paradigme matérialiste mis en place par l'arrivée de la science classique contribua à détacher l'homme de la vie ; à l'isoler dans un monde objectif et aseptisé. Par conséquence, l'éducation est devenue une pratique où l'étudiant est fortement encouragé à s'identifier à un monde compétitif, individualiste et dénué de toute dimension spirituelle.

En regard des derniers développements de la science (de la physique à la biologie), le paradigme matérialiste se trouve maintenant repensé et requestionné. L'émergence de cette nouvelle vision reconnaît un univers plus holistique aux éléments fondamentalement interreliés. Cette interrelation est perçue comme une clé permettant l'accès à une compréhension plus riche de la matière et de la conscience. En cherchant les manifestations d'une telle interrelation, l'éducation offre ainsi un environnement où l'étudiant s'identifie à une notion plus complète de la vie. En reconnaissant que chaque individu existe d'abord en rapport avec une communauté élargie, l'étudiant peut alors envisager l'expérience de sa relation avec le monde comme plus entière et significative. La philosophie de la science exposée dans cette thèse offre un langage permettant l'intégration d'une dimension spirituelle en éducation.

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## INTRODUCTION

In 1970 Sam Keen wrote *To A Dancing God* in which he criticized education for neglecting the imaginative and reflective capacities of the learner which are fundamental to a more complete development of personal identity. He argued that education failed to address basic life questions and obscured the personal dimension of learning. Keen recounts a vivid memory from his early educational experience to demonstrate the lack of attention given to the imagination and creative freedom of the learner. Sitting in his first-grade classroom, the young Keen had been monotonously practicing how to properly dot his *i*'s and form his *o*'s. Keen struggled against boredom throughout this repetitious exercise when suddenly his attention was drawn to a summer warbler engaged in building a nest in a tree outside his classroom. He became engrossed in the warbler's activities and dreamt about the day that he would become a great ornithologist. Keen's sojourn into the imaginative and creative realm of his natural wonder was halted abruptly with the appearance of his teacher, Mrs. Jones, standing over his shoulder demanding to know why he had not completed his penmanship exercises. Rather than letting Mrs. Jones in on his private fascination, Keen bit his tongue for he knew that no serendipitous warbler would justify any neglect of his "serious educational duties". Tuning out the warbler and tuning in to more "productive" exercises would become the metaphor that coloured Keen's educational experience over a period of twenty-five years and five degrees. The stage had been set by Mrs. Jones in grade one, a stage that had no room on it for enchantment, wonder or serendipity. Instead, education became an exercise that robbed

Keen of his enthusiasm, and left him with much knowledge but no wisdom, many ideas but few feelings. Keen wrote,

education had no responsibility for helping me to come to terms with the particular, the concrete, the idiosyncratic, the biographical, and the sensuous facts which formed the substance of my private existence. I learned little about the organization, appreciation, management, and care of that unique piece of human real estate which bears the legal name Sam Keen. (Keen, 1990, p.39,40)

In the chapter entitled *Education for Serendipity* Keen criticized education for its inability to stir in the learner the wonder and awe that is being human, and to awaken the learner's creative spirit. *Education for Serendipity* was about a shift away from the mechanical exercises of reading, writing and arithmetic that reflected the dominant paradigm of education of the time to a more integrated and symbiotic approach to learning that contributed toward a vision of the self as a creative entity within a creative universe. For Keen, education must "initiate the young into the accumulated wisdom and techniques of culture", but it must also "prepare the young to create beyond the past, to introduce novelty, to utilize freedom" (p.41). Imagination, curiosity and wonder must be encouraged, not rejected or cast away as insignificant to the development of the individual in the "real" world.

In the last twenty years since Keen published his book not much has changed in the Western approach to pedagogy. Schools still value productivity and efficiency over the nurturing of inspiration and creativity. Ron Miller suggests that schools in the present age see the minds of children as intellectual capital or raw material for the economy. Here the spiritual dimension of human experience is relegated to the

margins. "Modern schooling does not serve the spiritual unfoldment of the child. It serves capitalism, nationalism, a reductionist worldview. It serves a society that is completely committed to meritocracy, where there's fierce competition between individuals to reach the top of a social hierarchy" (cited in Glazer, 1999, p.190). Perhaps this is one reason why *To a Dancing God* has remained in publication for over twenty years and continues to be extensively sought out as a source of insight and inspiration today. As Keen himself writes, the message found in his book is perhaps more relevant in the 1990's than it was in the 1970's when it was first published (Keen, 1990, p.x). Pedagogy remains fixed on the need to develop skills geared toward "success", a view of education which Neil Postman (1995) says is concerned with the question of how to make a *living* rather than with how to make a *life* (p.x). Education has become focused on the engineering of learning while the *reasons* for learning have been but altogether forgotten (Postman, 1996, p.26). Learners are taught to view the world as an object that is theirs to be exploited and controlled. As Palmer (1983) suggests, "(e)ducation portrays the self as *knower*, the world as *known*, and mediates the *relation* of the two, giving the knowing self-supremacy over the known world" (p.21). In this system, one's identity as "knower" is limited to what one acquires as knowledge *about* the world without any sense of participation *in* the world. Page Smith (1990), author of *Killing The Spirit*, shows how this view of education permeates the university.

By 1900 the university had cast out every area of investigation and every subject that could not be subsumed under the heading "scientific" and had made all those that remained (like literature and philosophy) at least profess to be scientific. Excluded were such ancient and classic human concerns as

love, faith, hope, courage, passion and compassion, spirituality, religion, fidelity,...anything that might be somewhat encouraging to young people eager to receive some direction or,...develop a philosophy of life. (p.20)

The need to provide a forum conducive to the development of a philosophy of life is also something that David Elkind (1988) addresses. Outlining various philosophies or styles for the art of living, Elkind suggests that a philosophy of life is a way of forming a perspective of our lives that includes the consideration of others (p.202). Such a philosophy offers its practitioner meaning in his/her interdependent relationship with the world, an experience that is in direct contrast to the egotistic, individualistic framework that is often enforced by contemporary pedagogy. Elkind, Smith and Palmer argue that by rejecting the personal, imaginative, creative, and enchanted element of human experience, education loses substance, depth and vision.

For these authors, education is in dire need of a "spiritual" or depth dimension that asks educators to recognize the value of questions about what it means to be human and encourages students to seek answers to these questions in ways that are personally meaningful. What is implied is that a spirituality of education will help to reenchant the experience of learning. Angela Wood (1986) writes that even very young children are capable of expressing their own spirituality and argues that spirituality in education, if nurtured, enhances the educational experience and helps the child fully develop as a human being (p.98). Recently there has been an upsurge in spiritual interest which, in his article, *Desperately Seeking Spirituality*, Eugene Taylor describes as "a popular phenomenon of epic proportions that is at once profoundly personal, experiential, and transcendent" (Taylor, 1994, p.62). The upsurge in spiritual interest

that Taylor describes is not limited to any one event, but rather is found in a plethora of life-changing experiences whereby the individual is moved so profoundly that one's experience in the world becomes transformed and infused with greater meaning and purpose. Such phenomena include near-death experiences, enlightenment brought on by week-long seminars in the practice of Zen, and experiences of God brought about through the use of giant video screens and high-decibel "techno" music used to deliver the message of spirituality. Taylor also discusses several cases of individuals who have found their spirituality through the convergence of various spiritual practices.

According to Taylor, this renewed interest in spirituality reflects an increasing dissatisfaction with the fragmentation of modern life. This is not to say, however, that the interest in "spirituality" requires a return of religion to the classroom. In fact, M.Halstead (1996) argues that "spirituality" should not "refer to the development of specific beliefs, commitments and ways of life but must refer to the development of a particular dimension of the person" (p.2). In order to more fully comprehend how a spiritual education might contribute to a "dimension of the person", it is necessary to first have an understanding of what a spiritual education might represent. The term spirituality has been explored in various articles in the attempt to come to some kind of consensus as to what a spiritual education should consist of.

In *SPES*, Halstead suggests that spiritual education must be in harmony with the values of the broader society, must not be isolated from other aspects of the child's development, and must be grounded in openness in order to avoid indoctrination or the promotion of specific religious beliefs (P.2).

In 1993, the National Curriculum Council of England produced a document concerning the implementation of spirituality in the curriculum. This document was prepared for headteachers and governors in need of advice. It suggests that a spiritual education promotes: 1) the development of personal beliefs, 2) a sense of awe and mystery, 3) the experience of transcendence giving rise to a belief in the existence of a divine being (or the belief that one's inner resources provide the ability to rise above everyday experiences), 4) a search for meaning and purpose in the face of life's challenges, 5) an acceptance and understanding of one's personal identity, 6) the recognition of relationships and one's participation in community, 8) creativity, 9) the sense of being moved by beauty or kindness and hurt by injustice and aggression (Brown & Furlong, 1996, p.8,9).

In 1993, the Office for Standards in Education (OFSTED) also provided general insight into the subject of spiritual development in schools:

Spiritual development relates to that aspect of inner life through which pupils acquire insights into their personal existence which are of enduring worth. It is characterised by reflection, the attribution of meaning to experience, valuing a non-material dimension to life and intimations of an enduring reality (p.10,11).

Though the views of spiritual education described above are expressed somewhat differently, they share something fundamental in common. It is the depth dimension of the individual vis-a-vis the larger community of life that is what needs to be attended to in a spiritual framework of education. Learning how to look inside oneself, how to care, how to love, how to wonder, how to release the imagination are all characteristics of a spiritual education. The term "spiritual" may appear to pose a

semantic problem when we attempt to define it with precision. This is because what is fundamentally spiritual in experience is most often ineffable. "One is left feeling that spirituality is something...even something more...but...words fail" (p.26).

Keen proposes the creation of a space in educational institutions that would lend itself to the development of this spiritual dimension. For Keen, the department of "Wonder, Wisdom, and Serendipitous Knowledge" would provide a forum where students and teachers might explore questions and experiences related to being human that are not addressed in the present curriculum (Keen, 1990, p.42). In this department, the inner landscape of the individual would be given full credit. Here Keen proposes the development of such courses as: 1) Introduction to Carnality, where one would learn to intimately appreciate and value her/his own physical body rather than regard it as something to be objectified and used for competitive ends, 2) How to Tell Time: The Uses of Sundials, Calendars, and Clocks, a course where emphasis would be placed on the cyclical rhythms of nature so that one may move away from the linear constraints of time that our culture dictates, and recognize that life does not begin with birth and end with death but remains a part of all that ever was, is, and all that will ever be, 3) On Becoming a Lover, a course that would aim toward encouraging the individual to become a loving person by first nurturing one's loving capacities for things like flowers and rocks and eventually for other human beings in the I-Though capacity which Martin Buber describes (p.59), and 4) The Anatomy of Wishing and Willing, where dreams and fantasies would not be regarded as hindrances to "efficient educational activity" but as fundamentally important creative activities that may open

up real opportunities which the individual might explore in life. In Keen's 1990 edition of *To A Dancing God*, he suggests two additional courses that serve the student in the department of "Wonder, Wisdom and Serendipitous Knowledge". A course on Earthy Living would offer an alternative to the education that wants to prepare students for a future that is highly competitive, highly urban and highly corporate. This course would nurture a "voluntary simplicity" (p.xvii) where students would have the opportunity to develop an organic appreciation of the earth and where community, agriculture and the art of sustained living could be practiced. A course on Visual Literacy would encourage students to think critically about the images and information they receive through the media. For Keen, the aim of this course would be to help students reclaim and nurture the life of their spirit rather than growing up as "prisoners of propaganda who will choose only between brand names, standardized professions and the 'lifestyles' that are in vogue at the moment" (p.xix).

Keen's education for serendipity is about reclaiming the inner landscape of the individual and illuminating those areas of one's experience which provide insight into one's creative capacities. Here Keen focuses on the importance of identity and authenticity. Identity is not formed in isolation, however, but in a conscious state of belonging to and being connected with a greater, enduring reality. Imagining, loving, knowing one's body, and understanding the cycles of life all require an association between the self and the extended relationships that the self is engaged with. A spiritual education in this sense recognises the duality of being one and "All" (as Keen puts it) simultaneously.

Parker Palmer (1998) also recognises this living paradox and suggests that education must concern itself with "the community of truth" which he describes as "an image of knowing that embraces both the great web of being on which all things depend and the fact that our knowing of those things is helped, not hindered, by our being enmeshed in that web" (p.99). He argues that our present way of conducting pedagogy does not do justice to the reality of existence that we live in. Palmer writes,

(b)ut for all the power it has given us in science and technology, either-or thinking has also given us a fragmented sense of reality that destroys the wholeness and wonder of life. Our problem is compounded by the fact that this mode of knowing has become normative in nearly every area, even though it misleads and betrays us when applied to the perennial problems of being human that lie beyond the reach of logic (Palmer, 1998, p.62).

Palmer suggests that education must recognize "the community of truth" in the interconnected nature of existence and approach an understanding of this reality accordingly. He proposes a break away from the fragmented, reductionist and atomistic method of approaching ideas where the learner sees a particular subject as something outside of him/herself. Instead, he calls for a more integrated approach where the learner sees any subject as a set of interdependent relationships in which s/he is necessarily engaged by virtue of his/her interaction with them. Palmer's notion of the community of truth supports Keen's suggestion that one's identity can only move toward wholeness once the individual can see him/herself as a creative entity operating within a multidimensional reality that extends beyond the self. One may only become a complete self once the relationship to the larger community of life is acknowledged. Hence the living paradox of one and many, or individual and

community.

The problem of fragmentation is something I have felt throughout my own experience in education. During my highschool years I was strongly encouraged to follow an area of study in which I would be assured financial success. I was convinced that having a "respectable" profession as a business person, lawyer, or doctor was the key to stability which I learned to equate with happiness. Studying the arts was frowned upon by my educators, and as a result my longing for creativity was tucked neatly away in the attic of my mind. In university I found myself studying Marketing, hoping somehow that the creative element of advertising products and services would sustain me in the cut-throat world of commerce. Needless to say, I was deeply unsatisfied not only because I did not enjoy exploiting people, but also because I had never taken the time to know myself in my race for success. I was indeed living a life of lonely solitude amidst an ocean of other lonely individuals searching for the promised land - the land in which our identities would finally be affirmed as the result of financial success.

It was only upon the discovery of theologian Bernard Lonergan's method for self-transcendence in the third year of my undergraduate degree that I began to become aware of alternative ways of understanding life. Lonergan introduced me to my own reflective and creative capacities that had been dormant for so long. With baby steps I found the tools I needed to critically reflect upon the journey I had been on and realized that the life I was preparing myself for was not at all the life that I desired. Throughout my schooling I had become accustomed to looking outward, in

search of the titles, the money, the esteem, and the security that came with corporate success. These were merely shells, however, surrounding a vacuum that was myself, as I had never learned how to look inward. It was only upon my understanding that my existence was fundamentally interwoven with the community of life that I began to awaken my true self. The awareness of my personal relationship with what Keen refers to as the All, and what Lonergan refers to as God, gave me the space in which I could, for the first time, develop an authentic identity.

Inspired and feeling that I had awoken from a deep sleep, I felt that I had to share what I had learned with others since it had become obvious to me that many others were walking blindly through life as I had done for too many years. When I began working with homeless youth three years ago, I discovered how detrimental and oppressive the predominant ideology of our culture truly was. Here were teenagers, young adults and even children, many of whom victims of parental abuse, but many also that had dropped out of the educational system and ended up on the street because they did not wish to conform to the materialistic mentality that they were being assaulted by. Unable to cope with the demands that education was placing upon them, many of these young individuals went astray in order to experience the freedom that they longed for. Perhaps if the schools had provided courses in *The Anatomy of Wishing and Willing*, the beautiful poems, songs, stories, drawings and paintings that these young people created would have been hanging beside their desks in the classroom instead of being strewn across the walls of the homeless shelter that I worked in. Perhaps also, these creative expressions would demonstrate hope instead

of despair. It is true that homelessness is the result of a variety of unfortunate circumstances which I in no way wish to minimize, but the inhuman constraints of the educational system certainly play a key role in the equation.

In the midst of despair, the most important thing that I could bring with me to the shelter was the profound knowledge that each and every one of us is a valuable, creative participant in an incredible relationship with life. Sharing this insight was like working with a magic spell because whenever one of our young friends would absorb this truth, a part of them that had been in darkness for so long would awaken with curiosity and wonder, if even for a moment. A moment, however, is long enough because it is all the time that is needed to plant a seed of hope, or what Teilhard de Chardin would call an openness to the future where one feels and thinks herself "at home" in her world (Cousins, 1972, p.28).

Spending such intimate and privileged time with these wonderful young people has taught me a great deal about the dis-eased society that we live in, but I have also learned much about myself. Through entering into loving, empathic relationships with others I have been challenged to fend off my ego and operate instead from an authentic space in which community can truly be formed. My own learning process in this respect is ongoing, but continues to solidify who I am with every passing day. I am learning that my own identity is formed by participating in community as well as in the kind of reflective solitude that nurtures what Buchholz (1997) calls the inner dialogue and alone space in which the self develops (p.160). My own journey in becoming aware of Palmer's community of truth, or truth of community, is ongoing

but has been sustained and grounded in the plethora of life's expressions that remind me of our interconnected nature, and provide me with ever increasing points of reference of this truth, lest I forget (again!).

The contribution that I wish to make in this thesis is an additional framework for spirituality in education that has grown out of my own search for expressions of interconnectivity in life. The themes in my discussion center primarily on how "hard" science provides evidence of an interconnected universe that we participate in physically, and how the insights offered by science provide an entry point into the consideration of the nature of consciousness and other metaphysical matters. Much of my research has been influenced by the work of Fritjof Capra who has done a great deal to awaken the public's interest in the recent breakthroughs of physics, mathematics, biology and geometry. "We are, as Capra asserts, on the verge of a paradigm shift. A new vision of reality is penetrating the scientific world" (Griffiths, 1992, p.9). Capra is one among several scientists that I talk about who are "challenging the stale reductionism of the last four centuries" (Glazer, 1999, p.192).

In writing this thesis, I have intentionally considered the work of a limited number of authors. The reason for this is that the authors I do refer to have succeeded in providing a very clear synthesis of ideas, stemming out of various branches of scientific inquiry, that contribute to a coherent vision of an interconnected reality. My thesis primarily looks at physical systems of life in an attempt to demonstrate that interconnectivity is a principle that is apparent at any level of nature. The cumulative effect of my research should enable the reader to recognize his/her own connection to

the web of life in a very corporeal way, as well as be able to consider metaphysical and moral questions that arise from this profound knowledge. As the philosophy of science addressed in this thesis offers an entry point for the consideration of spirituality in education, the reader is invited to appreciate the notion that interconnectivity, interdependence and unity are principles of nature that receive and hold life at every level, providing us with a strong foundation upon which to re-define our understanding of reality. Moreover, that we are physical beings with self-consciousness suggests that conscious and conscientious participation in life requires an affirmation of the human experience of interconnectivity at both the physical and psychical levels. This thesis is meant in some way as a reminder that if we are to continue developing our humanness in education, it is incumbent upon us to recognize the spirituality of our physicality, and the physicality of our spirit. Only thus will we succeed in recovering what Berman (1984) calls the repression of the body and the unconscious, so that our participating consciousness may be restored in a credible way lending itself to the reenchantment of the world (p.125). In *Education for Serendipity* Keen states that his own listing of courses "reflects more areas of need than exact educational techniques for satisfying these needs" (Keen, 1990, p.43). My own framework for spirituality in the curriculum underpinned by the philosophy of science is by no means exhaustive, but is meant as an additional area of exploration in conjunction with Keen's courses, in which students may experience the totality of their existence.

In chapter one entitled *The Shift From Dissociation to Interconnectivity*, I

briefly re-visit classical science in an attempt to demonstrate how the hard sciences have contributed to the development of our present reductionist worldview. Here I suggest that classical science has lent itself to the construction of a paradigm that places the human being in a world that is characterized by fragmentation, isolation and disconnectedness - characteristics that have spilled over into the practice of pedagogy. This worldview, I suggest, stands in contrast to the more contemporary paradigm that the "new" hard sciences are contributing to. Here fragmentation is replaced by wholeness, isolation by community, and disconnectedness by interconnectedness.

As an entry point to the consideration of interconnectivity as foundation for a re-newed worldview, I explore Ken Wilber's notion of holonomy. Wilber defines holonomy (as opposed to hierarchy) as the structural framework of nature where life is always represented as a duality comprised of the particular and the communal. Here life is perceived as the dynamic interplay between the one and the many, between agent and community. This conceptualization provides the framework for the consideration of diverse systems of life that I explore throughout the thesis in an attempt to sketch a new cosmology upon which we may begin to restructure our curriculum. I begin the journey in a very broad way with James Lovelock's Gaia Theory. By clearly illustrating our fundamental interconnectivity with planet Earth, I hope to lay the foundation for a new narrative (Postman, 1996, p.5) that will help us to recognize ourselves as interdependent partners in nature.

Chapter two entitled *Pattern, Form and Process: Understanding the Dynamics of Life* begins to look more closely at how nature's systems operate. Here I focus on

the phenomenon of self-organization. Specifically, I draw attention to nature's mysterious ability to fashion itself into ever greater complexity and organization. Essentially this chapter suggests that matter is "married" to another element or force of nature which is perceivable only through its ability to organize matter into coherent patterns of activity. Matter and pattern work as one in life's process of becoming. Moreover, the patterns that lend themselves to the ongoing development of life are always characterised by the agency/communion duality that Wilber describes in his notion of holonomy, reinforcing the need to see life as an ongoing co-existence between the one and the many. This chapter will serve as a springboard for the final chapter in which I speculate on how we may consciously engage our own patterns with the goal of becoming more fully conscious of our participation in life, both physically and psychically.

Chapter three entitled *Nature's Highways: An Ongoing Journey into the Unified Fabric of Life* explores contemporary insights in the fields of biology and quantum physics. Suggested here is the existence of domains or levels to nature that have not been detectable to us, until very recently. These domains show further evidence of the interconnected nature of life. Morphogenetic field theory and quantum theory suggest that communication and the transmission of information are possible in ways that transcend any of our traditional notions of space and time. Matter which appears separated in space is actually interlinked in a unified network that knows no barriers, no frontiers. Once again, we are provided with further evidence that what appears as separate is in reality fundamentally interwoven into the unified fabric of life. With a

deeper understanding of the interconnected web of life at its various levels, we may begin to appreciate how we too may be subject to its forces, influences and opportunities. Notably, there are special considerations for us as physical entities with consciousness that are explored in the next chapter.

In the final chapter entitled *The Matter of Mind and The Question of Consciousness*, I attempt to demonstrate that events of consciousness usually categorized as paranormal may actually find some explanatory power in the activity of nature described by the "new" hard sciences. Specifically, I suggest that the interconnected universe evidenced in physical reality may have a counterpart in the domain of consciousness. Although I do not equate conscious activity with physical activity, I do suggest that the patterns, processes and operations of physical life may lend new insight, or "road maps", into understanding activity in the realm of consciousness. The research of Larry Dossey, M.D. in the field of prayer and healing is presented in this final chapter as one potentially important point of entry for human beings in the consideration of the nature of consciousness. Essentially Dossey's work suggests that the practice of prayer may provide a powerful and healing bridge linking together human beings and other forms of life. Furthermore, I introduce Bernard Lonergan's notion of self-transcendence as one way of recognising the relationship between body and mind thus providing the individual with agency, or a "seat" in the conscious activity of creating the "communal self". It is important to mention here that Lonergan's body of work relating to the notion of self-transcendence is vast indeed. Though the scope of this thesis does not permit me to even attempt to synthesize his

ocean of ideas, I am compelled to highlight a few substantial fragments of Lonergan's work as these speak directly to my thesis questions. Specifically, it is Lonergan's deep insight regarding the operations of the mind that I briefly visit. There seems to me a curious resemblance between Lonergan's principles of consciousness and the principles of matter found in the hard sciences. By drawing attention to the inclings of connections between Lonergan's work and my own, I hope to at least open a door to further research at another time.

My aim is to demonstrate that as human beings endowed with consciousness, we have diverse ways of understanding our place in the universe. By virtue of nature's interconnectivity at both the levels of physicality and consciousness, we may begin to radically redefine our understanding of the world and our place within it. This thesis is about the spirituality of science and the science of spirituality.

## CHAPTER 1

### THE SHIFT FROM DISSOCIATION TO INTERCONNECTIVITY

*We must...look in the obscurest corners and summon up the courage to shock the prejudices of our age if we want to broaden the basis of our understanding of nature.*

-C.G. Jung (1973, p.33)

#### 1.1 IT HASN'T ALWAYS BEEN THIS WAY

As I have suggested, educational institutions often contribute to the disenchantment of its students (and teachers). Robert Lichtman describes this shortsightedness in academia as a "widespread behaviorism...in social thought" (Smith, 1990, p.5) and writes that

Quality, uniqueness, creativity, and the moral dimension of existence fall before a reductive insistence upon measurement, qualification, and restrictive processes of infinitely tedious and irrelevant observation. The view of man which emerges is ahistorical, atomistic, mechanical, disjunctive, and, again, ostensibly neutral. (p.5)

The mechanical and disjunctive experience in education that Lichtman speaks about may very well be traced to a more general paradigmatic shift in

worldview where Western culture began to understand reality according to a materialist philosophy. In this chapter I will provide an overview of some of the more fundamental scientific principles that contributed to such a materialist philosophy. By recognizing how our perception of the world has been influenced to a large extent by a view of reality according to classical science, we may trace our present fragmented ideologies back to their roots and begin a process of freeing ourselves from their limiting constraints. With the insights of more contemporary science illustrating that reality is, in fact, an interconnected whole, we may begin a journey of "re-discovery" where the atomistic is replaced by the interdependent and the neutral by the engaged. By understanding the blueprints of nature we are not merely trying to gain insight into a reality that is "out there", separate from ourselves, but are in fact discovering information that tells us about who we are as active members and participants of life. We are learning that nature is not foreign to the human being but is in fact a primordial expression of humanness as much as being human is an expression of nature itself. There is no separation between the former and latter, nature and human are one and this is our key to the revitalization of the human spirit.

Bede Griffiths explains that until the sixteenth century, a universal or perennial philosophy existed in Europe and throughout the civilised world (Griffiths, 1989, p.10). This philosophy upheld the belief that the material world was pervaded by, and would find its explanation in, a transcendent reality. This transcendent reality was known as the Tao in China, the Sunyata or Void in Mahayana Buddhism, the Brahman in Hinduism, al Haqq or the Reality in Islam, and the Godhead or Supreme Being in

Christianity (p.11). In Europe, however, during the sixteenth century, this perennial philosophy began to dissolve and was replaced by a new materialist philosophy which continues to influence the way we view reality today. Though a complete historical account of the events which influenced the birth of the mechanistic philosophy is beyond the scope of this thesis<sup>1</sup>, an understanding of certain scientific insights which gave the mechanistic philosophy its momentum will help to explain why our culture (and pedagogy as part of that culture) now suffers from the pervasive problem of fragmentation.

## 1.2 CLASSICAL SCIENCE REVISITED

Isaac Newton, near the beginning of the eighteenth century, conceptualized the universe as a mechanistic device where concrete objects moving in space and time laid the building blocks of existence (Goswami, 1993, p.15). For Newton, the principle of causal determinism "which is the idea that all motion can be predicted exactly given the laws of motion and the initial conditions on the objects (where they are and with what velocity they are moving)" (p.15) was a universal law that determined the activity of the physical world without fail. According to this supposed law of causality, the universe can be imagined as a sort of three dimensional billiard table where balls of various sizes (representing physical forms ranging from atoms to planets) knock against one another to produce very determined outcomes. Although

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For a more thorough discussion of the rise of materialism, see *Bede Griffiths, A New Vision of Reality* (HarperCollins, Glasgow, 1992), pp.11-17.

Newton understood the universe to behave according to laws that appeared to be mechanistic, he did not take the world to be a machine, but rather an organism, or a body. In fact, Newton had a profound belief in God which animated and breathed philosophical life into his understanding of the physical universe. Moreover, many of his so-far unpublished manuscripts have been discovered in which he explores the subject of the paranormal (Griffiths, 1989, p.15). By the eighteenth century, however, only the mechanistic aspects of Newton's theories remained while its spiritual dimension was left by the wayside. What resulted from such a view, was the notion that distinctly separate physical entities were the stuff of the universe, and that the idea of a transcendent reality was no longer necessary to explain reality.

Another principle that fundamentally contributed to classical science was that offered by Albert Einstein in his theory of relativity. This theory was an extension to classical Newtonian physics in that it applied to bodies moving with high velocity. According to Einstein's theory, the highest possible velocity on nature's highways is the velocity of light at 300,000 kilometres per second (Goswami, 1993, p.16). One very important implication of such a theory is that all bodies in the universe, and all influences between those bodies, must have concretely identifiable locations in space-time and move with finite velocity in a linear direction. With locality as an underpinning law of the universe, no activity can take place at any speed faster than that of light, said Einstein (Goswami, 1993, p.16). This point will be important to remember as we explore the implications of quantum theory on our conception of space-time reality later in the thesis.

Reflecting then on the aspects of materialism that have influenced our notion of what "reality" is, it becomes clearer that our conception of life has been structured around the belief that we exist within a spiritless material world where every physical entity is fundamentally separate from all others. By extension, we too become individual "billiard balls" with no intimate connection to one another or to anything else. Wilber (1998) writes,

According to scientific materialism, The Great Nest of matter, body, mind, soul, and spirit could be thoroughly and rudely reduced to systems of matter alone....Gone was mind and gone was soul and gone was Spirit...and in its place, as Whitehead famously lamented, there was reality as 'a dull affair, soundless, scentless, colorless; merely the hurrying of material, endlessly, meaninglessly'. (p.13)

The present paradigm in education reflects this materialist philosophy and continues to contribute toward a sense of divisiveness between the individual and the world, or as Oliver (1989) says, a "repression and rejection of the experience of 'being in nature'" (p.65). Classical science has convinced us that reality is something to be understood in an objectivist manner, leaving no room for the transcendent wonder that was once so alive in the perennial philosophy. Reflecting on how this view of reality affects our teaching, Keen writes that a teacher "'must make a strict separation between the public and the private, the factual and the emotional, the objective and the subjective....A teacher must stick to those matters which can be communicated to the pupils in an antiseptic, objective manner'" (Keen, 1990, p.40).

The new paradigm of science suggests that to "re-enchant" our lives we must learn to see ourselves not as isolated individuals in a world of isolated objects, but as

interrelated beings who, by virtue of our individuality, exist within a creative community. The duality of individuality and community is the context in which we may truly discover who we are.

Recent discoveries in science are providing a framework that is replacing the vision of reality which classical science established so long ago with one that recognises life as an interdependent web of relationships. In this new paradigm in which fragmentation is replaced by unity, a more full understanding of reality can only begin to form as one recognises his/her interrelatedness to all life. Moreover, we are discovering that the tenets of strong materialism so long held in our minds as absolute have been recontextualised thanks to newer insights offered up by quantum physics and other disciplines of what I shall refer to as the new science. Determinism, causality and locality have by no means become obsolete. Indeed, these aspects of classical physics help us to understand our universe at a macroscopic level where classical bodies are the elements of our terrain. What has happened though, is the discovery of a deeper level of reality that demonstrates an underlying unity in all things. Looking to the new science may provide a view of education where the personal and the public are inextricably symbiotic in nature.

### **1.3 HOLARCHY AS THE STRUCTURE OF THE KOSMOS**

Ken Wilber is widely acclaimed as a foremost thinker in integrating Western psychology and Eastern spiritual traditions. Jack Crittenden (1997) notes that Wilber's body of work reaches across disciplines and synthesizes the teachings of religion,

psychology, physics, biology, mysticism, sociology, the ecosciences, neurophysiology and aesthetics in general (p.viii). Furthermore, Crittenden writes that Wilber "is giving us a pattern that connects all of life" and that "he has drawn us a detailed map, an integral vision for the modern and postmodern world, a vision that unites the best of ancient wisdom with the best of modern knowledge" (p.xii). Wilber explores the schism between science and spirituality and suggests that the underlying unity of the physical world offers us key insights into the nature of consciousness. At the very least, Wilber provides a scientific picture of reality that has interconnectivity rather than fragmentation as its foundation, providing a framework in which the atomistic and fragmented Newtonian paradigm of education may be challenged. Wilber (1995) "enters into" the paradox of the personal and the public, or individual and communal, by exploring "the relatively stable habits" (p.33) of the universe as a total system. In doing so he borrows Arthur Koestler's term *holarchy* (p.21) to describe the deep order of wholeness that is reflected in the structure of nature. The notion of the holarchy is derived from the term *holon* which Koestler coined to refer to that which is simultaneously a whole in one aspect and a part in another (Wilber, 1998, p.67). For example, a whole atom is part of a whole molecule, a whole molecule is part of a whole cell while a whole cell is part of a whole organism. Each entity is neither a whole nor a part, but a whole/part (p.67). Thus, according to Wilber, reality is organized as a holarchy where each successive unit in nature transcends but includes its predecessors, each time adding something emergent or distinctive that is not found in the unit before it. This is important to understand since the notion of the holon is

indeed the underlying principle upon which we may base our understanding of all systems of life, including ourselves. Wilber suggests that any thing can always be broken down to processes within processes within other processes, that it is senseless to speak of any particular entity as being in complete isolation from other entities. Indeed we may perceive a cat as a cat, a table as a table, an idea as an idea and a person as a person, but in reality these items are all reducible to processes within processes. Before any thing is a thing, it is a holon. Wilber uses the term *kosmos* to describe the entire holarchical structure of reality. He distinguishes the term *kosmos* from *cosmos* by explaining that,

the original meaning of Kosmos was the patterned nature or process of all domains of existence, from matter to math to theos, and not merely the physical universe, which is usually what both 'cosmos' and 'universe' mean today (Wilber, 1995, p.38).

I will borrow the term *kosmos* throughout this discussion to refer to all possible domains of existence. My intention is to demonstrate that the principle of interconnectivity expressed through the nature of holons will appear at every level and domain of the *kosmos* and provide us with a context in which we may understand ourselves more fully. Let us explore the characteristics of the holon so that we may identify them in the various expressions of life discussed throughout this thesis.

Wilber describes holons as having four fundamental characteristics: self-preservation, self-adaptation, self-transcendence, and self-dissolution (p.40). A holon's capacity for *self-preservation* can be understood as its ability to sustain the unique pattern that gives it its particular identity. In other words, holons have the ability to

preserve their *agency* over time. Consider the living cell for example, which is in constant exchange with its environment. Although the material elements of the cell are always in flux, its pattern remains constant so that rather than losing its form to its environment, it assimilates the environment into itself. The materials change but the structure or pattern remains intact. It will become apparent throughout this thesis that the existence of self-preserving, identity-creating patterns or structures is a principle that underlies all systems of life.

Holons also display the capacity for self-adaptation. That is to say, where a holon has the ability to assimilate aspects of its environment into itself without losing its unique structure or pattern, it also has the ability to accommodate itself to other holons, other sets of processes operating with different variables (Wilber, 1995, p.41). An electron, for example, will react to elements of its surrounding environment in such a way as to partake in its new surrounding by making itself compatible with the newly introduced variables. This is different from the assimilation process described above, since rather than bringing new elements into itself, here the holon displays the capacity to accommodate other holons, acting now as a part of a larger whole in a shared environment. The principles of self-adaptation and assimilation demonstrate that holons exist as independent parts able to sustain their individuality while also manifesting the ability to accommodate themselves into a greater horizon. Wilber writes:

We can just as well think of these two opposed tendencies as a holon's *agency* and *communion*. Its agency - its self-asserting, self-preserving, assimilating tendencies - expresses its *wholeness*, its relative autonomy; whereas its communion - its participatory, bonding, joining

tendencies - expresses its *partness*, its relationship to something larger.  
(p.41)

One should keep in mind at this point that by virtue of what we take the nature of a holon to be vis-a-vis its place in the kosmos, the principles of agency and communion refer not only to physical organisms but also to any expression of the holon in the social, political, spiritual sphere as well as any other. The holon, remember, exists both in the world of matter and in that of ideas. The latter will be explored in more detail later in my discussion of the self-making, value-creating person.

The third characteristic of the holon is its capacity for "self-transcendence". Self-transcendence here refers to a holon's ability to extend beyond itself and merge with other holons so that what results is a distinct new whole with its own horizon in which to practice agency and communion. Consider, for example, the oxygen and hydrogen atoms. Individually they are distinct holons maintaining unique structures and interactions with their environments. When an oxygen atom and two hydrogen atoms come together however, a transformation occurs and a new holon emerges as a water molecule. This is the principle of self-transcendence where *being* is inextricably linked with *becoming*.

The fourth fundamental characteristic of the holon is its capacity for self-dissolution. In the manner that a holon exhibits the capacity to assimilate, accomodate and to merge with other holons, it can also break down or become "unglued" along the same pathway from which it has been built up.

If a structure is forced to retreat in its evolution (e.g., by a change in the

non-equilibrium), as long as there are no perturbations it does so along the same path which it has come....This implies a primitive, holistic system memory which appears already at the level of chemical reaction systems. The system 'remembers' the initial conditions which made a particular development possible, the beginnings of each new structure in its evolution. We may say, the system is capable of re-ligio, the linking backward to its own origin. (Jantsch, 1980, p.49).

These four fundamental tendencies of holons - self-transcendence, dissolution, and the two symbiotic polarizations, agency and communion, provide clues to understanding nature and self. Hard science can substantiate the tension between these forces at the physical, material level of reality, but it shall become clear later in this thesis that the same forces also operate at the level of human consciousness. Consciously recognising our own place in the holarchy of nature may help us to construct the complimentary individual/communal identity that Keen suggests is necessary if we are to re-enchant our lives and develop a more coherent sense of self.

#### **1.4 GAIA THEORY AND THE RECONTEXTUALISATION OF THE HUMAN BEING IN NATURE**

The term *Gaia* originates from the ancient Greek myth of the goddess Gaia bringing the Earth into existence through her cosmic dance (Sahtouris, 1989, p.23). The story of Gaia's dance begins with the image of swirling mist in the black nothingness called Chaos by the ancient Greeks. As Gaia moves about in the darkness she is draped in white veils. Her body transforms itself into mountains and valleys, her sweat pours out to become the seas, while her flailing arms create the sky which she wraps around herself as protector and mate. Through the union of Gaia and sky (or

Earth and Heaven) came forth the creatures and forests that inhabit the planet. The story of Gaia is an appropriate metaphor to describe the creation of Earth for we are discovering that planet Earth is very much a living organism in a continuous process of self-creation, self-regulation and evolution.

The Gaia hypothesis, now Gaia theory introduced by James Lovelock suggests that our planet and its creatures constitute a single self-regulating system that is in fact a great living being, or organism (Sahtouris, 1989, p.9). Besides demonstrating that "the biosphere is a self-regulating entity with the capacity to keep our planet healthy by controlling the physical and chemical environment" (Lovelock, 1988, p.xv), Gaia illustrates, through an exploration of Earth's planetary evolution, how all of life's various creatures have originated from a common source. In fact it is the unfolding of life into its multiplicity of creations that has made the evolution of our planet possible. Earth is an organic entity which sustains and regulates itself by bringing complex life into existence. Essentially, Earth's being depends upon its *becoming*.

In *Gaia: The Human Journey From Chaos To Cosmos*, Elisabet Sahtouris (1989) expounds upon Lovelock's theory and develops from it a philosophy which helps the human individual to contextualise him/herself within the symbiotic network of life. Sahtouris calls attention to the Earth's natural evolutionary processes so that we may gain insight into how it is that we need to regard ourselves as conscious participants in the world.

The story of creation begins with the first movement of the universe's elements after the huge explosion of energy that scientists refer to as the Big Bang (Sahtouris,

1989, p.29). This movement involved the activity of *protogalaxies*, or first galaxies, that were a swirling of chaotic matter which formed into orderly, cosmic patterns. As energy formed into particles and the temperature of such energy cooled, pockets of particles were established that somehow developed distinct properties. With the intense motion of these particle clumps or pockets, some would come into contact with others and "stick together" to form simple atoms. As atoms moved about and temperate as well as gravitational imbalances developed, clouds were formed as atoms swirled into masses of gases. These cloud formations are the white swirling protogalaxies that sparkled with light as fast flying particles bumped into one another with great force creating sparks that are actually energy packets we call *photons*... (p.31). The first sub-atomic particles of the universe moved about developing patterns that were caused by pressures, explosions, heat and cooling, and formed into larger particles and then into various formations of atoms beginning a process that would continue to provide the platform for the creation of further structures such as stars and galaxies. The process of such evolution is fascinating indeed and demonstrates that the larger life formations visible to our eyes are in fact compositions of the earliest stardust, only rearranged and more complexly organized. Given the scope of this thesis, however, I will not go into detail about the evolution of our solar system<sup>2</sup>. For now what is important to consider is the fact that all life as we perceive it today is actually a rearrangement of the first

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For an elaborate discussion on the evolution of our galaxy, see *Elisabet Sahtouris, GAIA: The Human Journey From Chaos To Cosmos*, (Simon & Schuster, N.Y., 1989), pp.29-37.

sub-atomic particles that came into existence at the beginning of our galaxie's creation (p.37). Though this may seem at first like somewhat of a farfetched notion, it is supported with the use of modern scientific instruments. Life's evolution can be traced back *scientifically* to it's cosmic beginnings with the help of very powerful telescopes that can watch the birth of planets and galaxies in other areas of our solar system (p.31). Since what we see is the result of light bouncing off the objects that we are observing, and since it takes time for light to travel to our eyes, we can actually look back into time with powerful telescopes and watch as parts of our universe unfold. The implications of understanding present life as a continued, unbroken process of evolution from the same cosmic ingredients that were in existence four and a half billion years ago are monumental. Considering that there have not actually been any new elements introduced into the universe, but only further reorganizations of the first primordial elements, provides further evidence that all life is fundally tied together in a great web of activity.

As the Earth continued to come into being, the molecules, atoms and particles somehow arranged themselves into patterns that allowed new directions to take place in the creation of life. Over long periods of time the fundamental elements of the planet organized into more complex life forms such as microbes including bacteria (p.52). In fact, bacteria were the life forms that acted as catalysts for all other life to evolve. Bacteria are essentially our "ancestors" just as much as they are the inhabitants, orchestrators and stuff of our physical selves. To come to a fuller understanding of how this is so, it is helpful to look at just how bacteria became so

proficient.

When bacteria began to evolve they "acquired" the ability to carry out distinct functions. Some transformed poisonous gases into more breathable air (breathable for the bacteria of course), others had the role of filtering dangerous sunlight into more comfortable levels of heat while still others moved about altering the structure of less complex life forms in order to create digestible food (pp.53-62). Remarkable as this story is already, it becomes even more astounding as we consider just how our bacterial ancestors adapted to be able to complete more complex tasks. Different types of bacteria had different functions, but they also had different forms. While some were stationary and acted locally others were formed like twisting tails while still others had developed a "'proton motor' - a spinning disk that actually worked by electrical potential and had a tail attached to it so the bacterium could drive itself by propeller" (p.80). As the environment continued to change, there came times when supplies for nourishment were scarce or depleted in some areas, or the environment to which the bacteria had become accustomed was no longer able to provide the nutrients required for survival. What occurred at that point was somewhat akin to our notions of competition and war, however, with an interesting twist. Smaller bacteria began to invade other larger bacteria and feed off of them. They began to inhabit, or *assimilate*, the larger bacteria. As a result, the larger bacteria began to lose their own capacity to function properly and so were unable to produce the nutrients that the smaller bacteria were hungry for in the first place. Since the effect of this situation in the long term would have been the decay of both the smaller and larger host bacteria, our ancestors

somehow found a way to adapt. A "deal" was worked out so that the invading bacteria, which could produce a certain kind of molecule necessary for the host's well being, increased the amount of molecules they produced in exchange for the energy that the hosts were able to provide for them (Sahtouris, 1989, p.80). Thus something akin to what we may define as a cooperative was formed. In other cases bacteria who had the capacity for propulsion attached themselves to larger hosts and pushed them around to areas where food was more available (p.81). In this way the larger bacteria could produce enough energy for themselves and their passengers, as well as have greater access to supplies through their new-found mobility.

The activity of bacteria supports the notion of agency and communion that Wilber ascribed earlier to all levels of life in the kosmos. Sahtouris (1989) reflects upon this interplay between the one and the many, and hints at the insight it offers into human development:

It seems that nature must always work out a balance between the independence and interdependence of individual creatures - between their autonomy and their holonomy. Specialization - whether in human society, ecosystems, multicelled creatures, or bacterial networks - is a feature of whole systems that makes them more versatile and efficient through the interdependence it creates among parts....This balancing of autonomy and holonomy is very important to understand if we are to learn to manage our human affairs as well as Gaia has worked out hers. (pp.77-78)

In *Education for Serendipity*, Keen (1990) argues that students need to revive their sense of bodily existence and learn to recognize themselves as part of an extended reality. Gaia offers a wonderful way to help individuals celebrate their physical nature by providing a story in which one may identify him/herself as a

cosmic being in relationship with the entire universe. Postman (1995) might say that Gaia is the kind of story, or narrative, "that tells of origins and envisions a future, a story that constructs ideals, prescribes rules of conduct, provides a source of authority, and, above all, gives a sense of continuity and purpose" (pp.5,6). Gaia paints a vivid picture of where we originated from and concretely reminds us of the interconnectivity we share with all physical life. Gaia also has rich lessons to teach us about the value of cooperation and partnership, behaviours that are favourable to our well-being both as individuals and as a species. These lessons suggest that we are communal by our very nature and it is in community that we may find our identities and flourish as individuals. The Gaia hypothesis illuminates the interconnected web of physical life by demonstrating how the substance of the universe originates from a common source and functions in an interdependent manner. We are reminded that our individual lives are inseparable from our collective existence, and that we have a valuable and responsible role to play in the unfolding of life.

## CHAPTER 2

### PATTERN, FORM AND PROCESS: UNDERSTANDING THE DYNAMICS OF LIFE

*The right way to begin to think about the pattern which connects is to think of it as primarily...a dance of interacting parts and only secondarily pegged down by various sorts of physical limits...*

Gregory Bateson (1980, p.12)

#### 2.1 PATTERN AND FORM IN THE ORGANIZATION OF MATTER

When we look to nature for insight into human life, we find a vast array of possibilities. The Gaia hypothesis sheds light on the origins of matter, thus providing a place in which we may situate ourselves in the story of creation and ongoing life. However, when we observe the complexity of nature as life unfolds into its myriad creatures, one question arising is whether there is a "force" responsible for bringing matter into such coherent organization. Bede Griffiths asks,

How is it, for example, that electrons, protons and so on are organised into an atom? How is it that atoms are organised into molecules and again into more and more complex molecular structures? How is it that molecules are organised into increasingly complex forms in the living cell? How are cells organised...into plants, into animals and into the human body? (Griffiths, 1989, p.20)

Griffiths' question opens a further avenue for exploration. What property of nature enables matter to become organised in the way that it does? Could the answer

to this question shed new light on what it means to be embodied in the universe?

Griffiths is certainly not the first person to question the mysterious way in which matter comes to be organized. Philosopher and biologist, Aristotle, who lived between 384-324 B.C., approached this very same question and offered a hypothesis that is not so different from those offered by his contemporaries. Aristotle believed that matter was guided or influenced by an essential force found in the property of form which engaged matter in a process of development (Windelband, 1901, pp.139ff.; cited in Capra, 1996, p.18). Capra (1996) explains:

Aristotle...distinguished between matter and form but at the same time linked the two through a process of development....In contrast with Plato, Aristotle believed that form had no separate existence but was immanent in matter. Nor could matter exist separately from form. Matter, according to Aristotle, contains the essential nature of all things, but only as potentiality. By means of form this essence becomes real, or actual. The process of the self-realization of the essence in the actual phenomena is...called *entelechy* ('self-completion'). It is a process of development, a thrust toward full self-realization. Matter and form are the two sides of this process, separable only through abstraction. (p.18)

Aristotle's notion of *entelechy* suggests the co-operation of two forces working together to bring about a completion, or a move toward completion in the physical world. His suggestion of form may be interpreted as the idea, essence or potentiality of the thing in question. Through its infusion into matter, this essence becomes manifest in the structure that it directs.

Aristotle's distinction between form and matter is similar to the Pythagorean notion that pattern, or number, is something that limits substance, or matter, and gives it shape (p.18). The German Romantic poet Goethe also supported Aristotle's idea of

entelechy and saw nature's "moving order" (p.21) as patterns of relationships operating within an organized whole.

The orderly movement of matter in the universe has also been referred to as Ki, in Japan. Jacqueline Gail Bowering (1995) explains that "the term Ki, in Aikido [the Art of Peace which originated in Japan], refers to the energy that drives the universe. Analogous to 'chi' in Taoism, it is also the creative force that holds everything together" (p.34).

The idea of form or substance supports the notion of an ethereal realm of existence that seems to contain some kind of inherent level of organization. Aristotle's "essence" may be reinterpreted as something like a higher or more profound dimension of existence that fuels the activity of the material plane and brings matter into actuality from a prior state of potentiality. Though it is difficult to quantifiably support Aristotle's notion of substance and form, contemporary science is approaching the subject from an empirical angle and is revealing that pattern is in fact the skeletal foundation of matter's complex structure.

## **2.2 AN EXPLORATION OF LIFE'S ORGANIZATIONAL STRUCTURE**

Since form is a property that can only be perceived through its manifestation in matter, scientists have sought to understand its influence by breaking the physical universe down into ever smaller parts. The mechanistic paradigm had us believe that

the material world was constructed from fundamental building blocks - atoms, molecules and other macro objects thought to be the smallest elements of the universe's structure. This, however, is no longer the case. The field of Biology has radically challenged this mechanistic view of life.

At one time biology focused primarily on organisms or species in its attempt to understand nature. It then turned to plants and animals, and then discovered that cells were the common elements in all organisms. Biologists have succeeded in breaking down the cell into its constituent parts or macro-molecules such as enzymes, proteins and amino acids (Capra, 1996, p.80). More recently, however, biologists have discovered a deeper level still to the complexity of physical life. This complexity can best be understood as the *pattern of relationships* that provide the organizational framework which allow for specific entities to come into being.

Although biologists cannot determine just how matter acquires the ability, the "know-how", to develop into specific entities or organisms (How do certain cells in our bodies know to become liver cells, heart cells, and so forth?) they can observe the processes that it goes through as it takes on ever more complex degrees of organization.

When scientists began to discover that the former conception of physical life as operating according to linear laws and hierarchical formations was in fact mistaken, and that instead, life was at its most basic level reducible only to sets of relationships between ever smaller constituent parts (holons), it became necessary to study the nature of the relationships themselves and the processes that were engaged in the

formation of these relationships. Again, physical reality was not about the substance of the universe, but rather about the form that substance would take on.

Matter has the ability to self-organize, but it also has the ability to sustain itself and evolve into more complex systems. In our new understanding of material systems, "(e)mphasis is then on the becoming - and even the being appears in dynamic systems as an act of becoming" (Jantsch, 1980. p.6). Biologists and physicists distinguish between living systems that are in a state of *equilibrium* from those that are in a state of *non-equilibrium* (p.26). Jantsch (1980) explains a system in a state of equilibrium as "an isolated system without environment [which] shows a particular type of self-organization (or, to be precise, self-disorganization). It will evolve in the direction of its equilibrium state and remain there" (p.26). A system in a state of equilibrium will maintain its overall structure throughout the ongoing changes and replacements of its components (Capra, 1982, p.271) manifesting its self-adaptive tendency as a holon. In contrast, systems that operate in states of non-equilibrium, or far from equilibrium, have the tendency to go through developmental changes more frequently - their levels of organization are somewhat more unstable and in flux.

In a microscopic view, the system gains the experience of innumerable encounters and exchanges between system components...but in a macroscopic view all that changes is the relation between free energy and entropy in the total system. (Jantsch, 1980, p.26)

Interestingly, systems that are far from equilibrium have the ability to go through transformations that often result in the creation of new, highly ordered systems (p.26). It is this curious characteristic of structuration in nature that is relevant

to this thesis since humans too are systems in states of non-equilibrium exchanging with environments on different levels. To further understand structuration, let us consider the example offered by French physicist Henri Bénard (Capra, 1996, p.86).

At the beginning of the century, Bénard, who was interested in the activity of life systems in states of non-equilibrium, turned his attention to the process of heat convection. He hoped to understand how a stable system of liquid was able to "protect itself" and sustain its organization once it was knocked out of its prior state of stability by increased temperature. In his experiment, Bénard discovered that heating a thin layer of liquid (thus disrupting its stability) resulted in the liquid's ability to self-organize so that unanticipated complex forms emerged where before there had been none. As the liquid is first heated uniformly from below, it remains at rest while the heat is transferred by conduction alone. However, when the temperature between the top and bottom of the liquid reaches a critical value, *conduction* is replaced by *convection* where the heat is transferred by the motion of large numbers of molecules. At this point a very fascinating phenomenon occurs. When the liquid reaches this critical value in temperature difference, "a very striking ordered pattern of hexagonal ('honeycomb') cells appears, in which hot liquid rises through the center of the cells, while the cooler liquid descends to the bottom along the cell walls" (Capra, 1996, p.87). Thus it was discovered that when systems reach a critical point of instability, or bifurcation point, the stage is set for new emergent properties to come into existence. Jantsch explains that "a new macroscopic order emerges which may also be understood as a macroscopic fluctuation, stabilized by energy exchange with the

environment....From the perspective of the molecules, this phenomenon of structuration corresponds to a higher level of co-operation" (Jantsch, 1980, p.22). The ability for life to self-organize in this way can be seen throughout nature. In the case of heat convection for example, we can also observe hexagonal circulation vortices that leave their marks on sand dunes in the desert and on arctic snow fields after the flow of warm air has left the surface of the earth and moved toward outer space (Capra, 1996, p.88).

The phenomenon of self-organization was further studied by Ilya Prigogine, Nobel Laureate and professor of physical chemistry at the Free University of Brussels (p.86). Prigogine was fascinated with life's ability to self-organize and felt that nature's processes had something important to tell us about our own existence. The subjects of Prigogine's study were what he coined *dissipative structures* (Capra, 1982, p.271; Jantsch, 1980, p.29). Dissipative structures are, like Bénard's convection, systems that are far from equilibrium. They go through transformations and instabilities resulting in the emergence of new structures of increased complexity. These structures are necessary for the system's self-renewal. The system is dissipative because it breaks down other structures in its process of metabolism which are then dissipated in the form of waste. As Prigogine discovered, however, waste for these systems does not imply a move toward degradation or entropy representing the decomposition of the system. Instead, the creation of waste is a necessary function in the exchange of a system with its environment. New materials are always being taken in and let out, but the system as a whole remains in tact.

The process of renewal described by Prigogine was also introduced by Ludwig von Bertalanffy around 1940 in his theory of "open" systems. He distinguished these systems from "closed" systems which were isolated and self-operative. Bertalanffy explains that a system is open when,

the organism is not a static system closed to the outside and always containing the identical components: it is an open system in a (quasi) steady state...in which material continually enters from, and leaves into, the outside environment. (as cited in Capra, 1996, p.48)

In these open systems, waste is not considered in the same way as it would in a closed system. In a closed system, decomposition is understood as a move from order to disorder or greater chaos, as waste is stored in the system itself. This process is known as entropy and was thought to be the normal fate of all living systems. Indeed it was from this notion of entropy that the world was imagined as a wound-up clock slowly unravelling toward a complete stop. Bertalanffy demonstrated that the universe was in fact not in a state of inevitable inertia, but was instead in a state of homeostasis or self-regulation where the disorder of some systems actually gave birth to the existence of new, more highly organized systems.

When Prigogine presented his theory of dissipative structures in 1967 he confirmed Bertalanffy's view of open and closed systems. Science was introduced to the idea that life somehow managed to sustain itself and evolve by maintaining an interplay between individual systems and their environments (Capra, 1996, p.89). Without this interchange, neither the system or the environment would subsist, since one creates the other and vice versa. Once again the living paradox of particularity and

community was evidenced in nature.

As we saw in the example of Bénard's heat convection, open systems maintain their organization but also have the capacity to evolve. We know about dissipative structures and how the "self" of the system is sustained through constant interaction with the environment, but there is another pattern embedded in nature that gives us insight into our own rhythmic properties. Norbert Wiener coined the term *feedback* (Capra, 1996, p.56) to describe a system's ability to communicate with itself, maintaining its structure and evolving into greater complexity. Feedback, or a "feedback loop", refers to an arrangement of elements causally connected in a circular stream of organization. Because of constant exchange with the environment, there are always new elements introduced into the loop so that whenever the last link bends back to affect the first, the system as a whole is modified or changed in some way. When new environmental elements or "information" are introduced, the system maintains its overall structure, while at the same time becoming more complex. Wiener's concept of feedback demonstrates an activity of nature which enables particular entities to evolve as a result of their dynamic exchange with their surround. Thus pattern is not only operative *between* the microcosm and macrocosm, but also *within* the microcosm itself. The architecture of nature enables particular entities to evolve in their dynamic exchange with the larger "community".

Research of the feedback pattern of nature was developed by Manfred Eigen, biochemist and Nobel Laureate in chemistry and director of the Max Planck Institute for Physical Chemistry in Gottingen (p.97). In the 1970's, Eigen proposed that the

origin of life on Earth may have been the result of a process of progressive organization in chemical systems far from equilibrium. This process, Eigen hypothesized, involved *hypercycles* of multiple feedback loops. These hypercycles are like groups of feedback loops that act upon one another to form something like a community of interrelated processes. Hypercycles are not only capable of remaining stable, but also of self-replicating and of correcting errors, suggesting their ability to retain and transmit complex information. Thus self-organizing, non-sentient living systems, may be considered as the precursors to more complex life. The lesson here may be that the roots of life (or at least the fundamental processes that it engages in) may reach down into the realm of "non-living" matter.

Chilean neuroscientist Humberto Maturana studied living systems' ability to self-organize at the level of the nervous system (p.96). He too found that the nervous system operated according to feedback loops and hypercycles, and coined the term *autopoiesis* to describe life's ability to self-create. Auto means "self" while poiesis means "making". As such, autopoiesis seems to be the underlying dynamic of all living systems, including humans.

James Lovelock who introduced the Gaia hypothesis applied the idea of autopoiesis to the Earth as a living, self-organizing, organic system. For Lovelock the Earth's atmosphere is an open system far from equilibrium, characterized by a constant flow of energy and matter (p.100). According to Lovelock, the Earth had the ability to regulate its own temperature even though the sun's heat has increased by 25% since life began on the planet. Though he observed this, he did not know exactly how life's

organisms contributed to this phenomenon. It was in Lovelock's collaboration with American microbiologist Lynn Margulis that things began to gel. Margulis studied the production and removal of gases by various organisms, including especially, the myriad bacteria which we explored earlier in chapter one. Together they hypothesized that feedback loops bring about the self-regulation of the planet. Moreover, these loops link together living and non-living systems (p.102). The Earth, they found, is a dissipative structure far from equilibrium in the sense that it is in constant exchange with the environment (the sun's heat, elements from space, and so forth) and is constantly pumping out waste in the form of energy that it no longer requires. The Earth adheres to the pattern of feedback as it maintains its structure while evolving new life to handle the external elements that it is subject to. Capra (1996) refers to the carbon dioxide cycle to demonstrate how pattern is embodied in the Earth's activity. I have decided to quote Capra in full here, because the example he provides creates a vivid image of the interconnectivity of life on Earth, and clearly describes the ideas of systems far from equilibrium, feedback loops, and dissipative structures presented in this section.

The Earth's volcanoes have spewed out huge amounts of carbon dioxide (CO<sub>2</sub>) for millions of years. Since CO<sub>2</sub> is one of the amino greenhouse gases, Gaia needs to pump it out of the atmosphere; otherwise it would be too hot for life. Plants and animals recycle massive amounts of CO<sub>2</sub> and oxygen in the process of photosynthesis, respiration, and decay....(T)he excess of carbon dioxide in the atmosphere is removed and recycled by a vast feedback loop, which involves rock weathering as a key ingredient. In the process of rock weathering, rocks combine with rainwater and carbon dioxide to form various chemicals...The CO<sub>2</sub> is taken out of the atmosphere and bound in liquid solutions...The carbonates are then washed down into the ocean, where tiny algae...absorb them...to make shells of chalk (calcium carbonate). So the CO<sub>2</sub> has now ended up in the shells of those minute

algae. When the algae die, their shells rain down to the ocean floor, where they form massive sediments of limestone. Because of their enormous weight, the limestone sediments gradually sink into the mantle of the Earth and melt...Eventually some of the CO<sub>2</sub> contained in the molten rocks is spewed out again by volcanoes and sent on another round in the great Gaian cycle. The entire cycle...acts as a giant feedback loop, which contributes to the regulation of the Earth's temperature. As the sun gets hotter, bacterial action in the soil is stimulated, which increases the rate of rock weathering. This in turn pumps more CO<sub>2</sub> out of the atmosphere and thus cools the planet (p.104-106).

As we explore nature's processes of development, what emerges is the coexistence of matter and pattern. The patterns that physical nature embody are the navigational devices that bring the physical elements of the universe into coherent operation. As physical entities, we too exist in the stream of pattern that is involved in guiding life's creative journey. The developmental processes of nature explored above may help to remind us that we are in constant exchange with the world, but also that this exchange, this communion, is *a priori* to our own individual lives. An awareness of the creative current that we are enmeshed in may be fundamental to fully understand who we are. In the next chapter I examine how biology and quantum physics raise further questions about the interconnected universe. Here we are led to consider not only the physical interconnectedness of life, but also how matter may be linked by an interwoven fabric of communication pathways where information is stored and passed along in ways that transcend our classical linear conceptions of space-time reality.

## CHAPTER 3

### NATURE'S HIGHWAYS: AN ONGOING JOURNEY INTO THE UNIFIED FABRIC OF LIFE

*To see a World in a Grain of Sand*

*And a Heaven in a Wild Flower*

*Hold Infinity in the Palm of your hand*

*And Eternity in an hour*

-William Blake (cited in Erdman, 1982, p.490)

#### 3.1 MORPHOGENESIS AND MORPHOGENETIC FIELD THEORY

Cambridge biologist Rupert Sheldrake's recent postulation of *morphogenetic fields* is very similar to Aristotle's notion of entelechy. Sheldrake proposes the existence of "form-generating" fields that are "the causal agents of the development and maintenance of biological form" (Capra, 1996, p.27). Sheldrake's hypothesis is a more sophisticated version of the idea of vitalism that was proposed by the German embryologist Hans Driesch. Driesch borrowed Aristotle's term entelechy to describe the process of self-realization unifying matter and form. For Driesch, however, form was a separate entity acting on matter without necessarily being a part of it (p.26). In 1981, Sheldrake published his theory regarding morphogenetic fields, or m-fields, suggesting the existence of a frequency domain in which information about the form and intelligence of any species is stored and communicated across space and time

(Talbot, 1988, p.3). Although the idea of m-fields was advanced in the 1920's by embryologists Alexander Gurwitsch and Paul Weiss, they never expanded upon their theory with regard to how these fields might work or what they were. It was Sheldrake who elaborated the theory and thus made it more "tangible" in the field of biology (p.62). Essentially, Sheldrake proposed the existence of frequencies or waves carrying within them information which affects the organization of matter in meaningful and intelligent ways. These frequencies or fields might be imagined with the analogy of a radio. The signals giving rise to the voices or music that emerge from the radio come from outside the radio. These signals are of a different order than the radio set itself (Griffiths, 1989, p.22). Just as a radio tunes into particular signals, so do different kinds of matter tune into specific frequencies, suggests Sheldrake. M-fields, according to Sheldrake, are the "carriers" of pattern that allow life to create itself intelligently and coherently.

As an organism starts to develop it begins to resonate to a certain field, and the more the organism follows that particular path the more it becomes habituated and goes on developing within that field to its final form. Morphogenetic fields are thus seen to be an important component in the explanation of the course of evolution. (Griffiths, 1989, p.22)

Sheldrake's hypothesis came about as a result of his exploration into the problem of *morphogenesis*. Originating from the Greek term *morphe*, meaning "form", and *genesis*, meaning "birth", morphogenesis concerns itself with the mystery of how living forms come into being (Talbot, 1988, p.58). For example, though science has determined that DNA is the blueprint for living organisms, it has not been able to tell us how individual cells, which begin by sharing the same coded DNA, somehow

develop into distinct forms. When a fertilized egg begins forming into a fetus, the cells composing it are undifferentiated and all share the same DNA. The first problem of morphogenesis asks how these undifferentiated cells "know" to read particular aspects of the DNA so as to become heart cells, liver cells or brain cells. How does matter acquire the ability to take on specific functions when there seems to be no apparent guiding system in effect at the outset? A second problem of morphogenesis has to do with living organisms' capacity for regeneration. If a newt loses a leg, for example, it will generate a new one. If a starfish is broken into pieces, the separate pieces will regenerate into individual starfish. How does nature know what to become and how to repair itself? Sheldrake suggests that there is a process at work in the universe whereby species (and inanimate objects) tap into a field that is the carrier of information specific to that field's past. For Sheldrake, when a species learns something new, that information is somehow integrated into the m-field (an intangible yet spatially real structure in the universe) that acts like a current running through the development of that particular species.

The experimental results of Harvard psychologist William McDougall support the idea of m-fields. McDougall's work began in the 1920's and continued over a period of 34 years. His original intention was to test Jean Lamarck's theory that acquired characteristics are passed on genetically through successive generations. His experiment was simple yet yielded astounding results. McDougall created a situation in which rats had to find a safe way out of a maze. One end of the maze was illuminated while the passage at the other end was dark. Since the rat is inclined to move toward

illuminated areas, McDougall electrified the lighted end of the maze. He wanted to determine how long it would take the rats to figure out that only the dark passage provided safe access out. McDougall discovered that successive generations of rats kept completing the maze more quickly. In order to determine whether this learning was somehow being encoded in the rats genes, McDougall bred only the slowest learning rats but still found that the rate of increase in learning persisted, so much so that the twenty-second generation of rats were figuring out the maze ten times faster than the first generation had. Although this in itself was quite remarkable, McDougall discovered something else that was even more astounding. When put through the same maze, rats that were from completely separate, untrained lines displayed the same rate of improvement as the trained ones, suggesting that the learning was happening in the species en masse. McDougall thus concluded that information could not have been passed down genetically (as cited in Talbot, 1988, p.63).

Among the critics of McDougall's hypothesis was Scottish researcher F.A.E. Crew who was intent on disproving McDougall's research (p.64). To his surprise, however, Crew's rats which were from completely different genetic lines than McDougall's, seemed to possess the knowledge of the maze where McDougall's had left off. Where McDougall's first generation rats had gone through hundreds of successions before manifesting a change in their behaviour, some of Crew's rats learned to avoid the electrified gangway immediately while some were never even shocked at all! Such experiments were further carried out by other researchers whose studies yielded similar results, again with rats from completely different genetic lines

(p.64). These experiments suggest that learned behaviour, in the case of the rats, could not have been passed down genetically but must have been communicated through some other medium.

According to Sheldrake the m-field of the rats carries the acquired learned behaviour of former generations. The rats have a way of unconsciously *tapping into* their respective m-fields. M-fields also exist with regard to inanimate objects as in the case of crystals. When a chemical substance is crystallized for the first time it does not immediately "know" which crystalline form to take. The substance will change into various forms before settling upon its structure. Amazingly though, when a chemical substance has been crystallized once, it will immediately take on the same structure when introduced again anywhere in the world. That is, once a chemical has "taken the time" to "decide" upon its crystalline structure once, it is as though the information is stored and accessed immediately the next time around (p.70). Though it is as yet impossible to quantitatively prove the existence of m-fields, there still remains the mystery of how life, animate and inanimate, learns to share valuable information in a way that does not seem to require communication as we understand it. If m-fields are real, or are at least close approximations to that which is responsible for the sharing of information among life forms, then we may have a plausible hypothesis with which to expand upon our knowledge of life's self-organizing properties as well as life's ability to communicate valuable information with itself.

If Sheldrake's M-fields are real, we are forced to re-examine the way in which we understand the principles of space-time reality. Until most recently, science has

developed an image of the universe as a linear, material system that adheres always to the natural laws of space-time according to what classical science has prescribed.

Accordingly, any communication must take place in a linear form according to some causally determinate progression of events. The rats of McDougall and Crew, and the crystallized chemicals, however, suggest a different idea of the universe. Traditional explanations of information transmission simply do not apply in these cases. This is not to say that classical science is wrong, but only that it may not provide an adequate picture of reality in its wholeness and complexity. Though the idea of m-fields may have difficulty justifying itself according to the quantitative criteria that classical science demands of its theories, there are other domains of research that provide support for Sheldrake's claims. Remember that if life does operate according to morphic resonance, it does so in a way that transcends our usual definitions of space and time. All matter is somehow interlinked in a system that knows no barriers and operates without frontiers. Although this is a principle that may be difficult to recognize as legitimate from the standpoint of a materialistic imagination, there is evidence to support the claim that communication does indeed exist at a level that transcends time and space.

### **3.2 THE WEB OF LIFE EXPRESSED THROUGH QUANTUM PHYSICS**

Quantum physics is the domain that studies matter at the sub-atomic level. Whereas classical scientific thought has taught us that all of physical reality is reducible to basic building blocks found in the atom, quantum physics has shown us

that the components of the atom can be further reduced to descending levels of constituent parts opening like Chinese boxes one inside the other. Within each atom is a nucleus that is composed of protons and neutrons. Yet these protons and neutrons are also divisible into even more elementary particles such as the elusive quarks (Fraser, 1992, p.115). Indeed, when matter is broken down far enough we see that what has appeared to us all along as individual entities are in fact sets of relationships between things which are themselves still further sets of relationships - holons. As we explore the network of relationships that provide the framework for quantum activity, it is becoming evident that reality is far more complex than we had once thought. Furthermore, the subatomic realm of nature is helping us to see more clearly just how interconnected the kosmos really is. Let us explore the mysterious activity of the quanta.

German physicist Werner Heisenberg's *Uncertainty Principle* demonstrates that quantum particles do not travel in a linear way as do objects such as bowling balls at the macroscopic level of nature (Goswami, 1993, p.36). When we observe the movement of such a particle we may obtain its *location* at a given point in space but it is impossible to simultaneously obtain its *velocity*. Without an object's velocity or energy at a specific point in space, we are unable to determine its trajectory, and so cannot ascertain the route that it takes in its journey from point A to point B. The reason for this difficulty in measurement is that when we are not observing it, the particle actually exists as a continuous wave "which spreads out to fill the entire universe, so that at a certain (particle) which is identifiable as being at point x has a

very tiny fraction of itself spreading billions and billions of light years away" (Griffiths, 1989, p.18). It is only when we observe it, that the wave collapses into a single particle entity. The movement of a quantum particle occurs while it is in a wave state with no fixed position in space, while its position can only be determined once the wave, upon our observation, has collapsed into a particle state with no movement. This dual particle/wave, or wavicle, nature of the quanta suggests that any subatomic particle exists in a state of possibility and does not become localized until it is observed by a human being.

Thomas Young's double-slit experiment demonstrates that when a particle is in its wave state, it actually exists in different points in space simultaneously (Talbot, 1988, p.26). The experiment was carried out by releasing individual photons of light one at a time and allowing them to pass through one of two slits before hitting a photographic plate where their position could be measured. The photographic plate acted as the "observer" causing the particles to collapse thus making their positions known. When the pattern of interference on the plate began to emerge after several photons had passed through the slits, it became apparent that each photon somehow managed to pass through both slits simultaneously before collecting itself and striking the plate behind one slit or the other as a solitary projectile (pp.23-24). Thus, until it is "looked at" by a human observer causing its collapse into a single entity, a wavicle exists in a state of possibilities occupying various indeterminable points in space.

When Heisenberg introduced his Uncertainty Principle claiming that quantum objects maintained a dual nature, his theory stirred much controversy. Einstein and his

colleagues, argued that the universe could not behave in such a random way where at one moment things would be particles and at the next waves. Moreover, to suggest that human participation had an affect on the activity of sub-atomic behaviour implied that reality was not objective, and this, they said, could not be the case (Talbot, 1988, pp.24-25). Einstein and his colleagues opposed the idea that it was impossible to obtain the simultaneous, correlated measurements of a particle's position and momentum, and proposed that a measurement could be obtained for both quantities with the assistance of a second particle that was in some way fundamentally linked to the first. As such, they decided to use a *particle-pair* as their subject. A particle-pair comes into being when a single particle decays into two twin particles that share all of the same properties but travel in opposite directions. Therefore, it was thought that if such twinned particles were observed, one could be used to obtain the position while the other for its momentum. This would dispel Heisenberg's principle and would demonstrate that observer participation did not affect the nature of the particle. One apparatus would measure the position while the other would measure the momentum without causing the wave's collapse into a single stationary object.

Physicist Neils Bohr argued, against Einstein, that the polarization of any given particle does not exist in actuality until it is pulled out of its state of *possibilities* by a human observation (Talbot, 1988, p.30). Thus even if one could obtain two measurements from a set of paired particles, it would be wrong to say that the two measurements correspond to a single original particle since the observer has affected the twinned particles independently.

This argument was anticipated by Einstein and his colleagues. They argued that if only one twin of a paired particle was measured, thus "bringing it" into a certain state where its angle of polarization could be determined, the other twin should, upon observation, be found to have exactly the same angle of polarization since they exist on identical axes and share a mutual orbit. This, said Einstein and the others, was impossible for it would imply some ghostly action-at-a-distance where one paired particle could somehow simultaneously communicate its position to its correlated partner at the moment it is brought into a state of certainty. It wasn't until 1982 that technology allowed science to settle the argument (Talbot, 1988, p.32).

It was French physicist Alain Aspect that proved Einstein wrong and allowed quantum physics to finally come of age (p.32). Aspect used photons produced by atoms of mercury vapour excited into a higher energy state as the particle pair. With the help of a high speed instrument that was able to accurately measure the position and angle of a particle a billionth of a second after it left its source, Aspect obtained the angles of polarization for countless particle pairs. He added them up to discover that the level of correlations was far greater than would be expected if subatomic particles obeyed the same rules as macro-objects. When one particle was measured for its angle of polarization, its "twin" would simultaneously adopt the same angle. Moreover, it did not matter how far apart the particles were when the measurement was taken. Somehow one twin was able to communicate its position to the other simultaneously, suggesting that the speed of light could no longer be considered the fastest possible velocity in the universe, and that communication may occur in ways

other than by following linear pathways.

We do not as yet understand *how* this phenomenon occurs, but we now know that it *does* occur. What the Aspect experiment tells us is that there is some domain, some realm in the universe where information is shared between material things in a way that defies our notion of space-time reality. Might there be some connection between Aspect's action-at-a-distance and Sheldrake's m-fields? Even if Aspect and Sheldrake's ideas do not necessarily point to the same phenomenon, they at least tell us that there is a dimension of nature that we had not been unaware of. Here information is carried through the kosmos in ways we have never imagined possible. Moreover, since our own bodies are composed, at some level, of quantum particles, we now have further support for the idea that we are, at a fundamental level, interconnected with all life. The dual nature of Heisenberg's particle/waves and the action-at-a-distance of Aspect's particle- pairs are more than just insight into subatomic phenomena. They are insight into the subatomic structure of all physical substance, including the substance of our own bodies. The discoveries of quantum physics provide us with further clues into the unified structure of nature and our place within it.

Though quantum physics offers the latest scientific insight into the nature of life, we must not assume that it is the final frontier. Science is ongoing and we must consider the possibility that there may be even deeper levels to reality that we have yet to uncover. Nature appears to have different planes of organization suggesting that what we see or experience is only a fraction of a much deeper order that for the most

part is undetectable to our ordinary senses. Are there other secrets that await us beyond the quantum?

Physicist David Bohm suggests that beyond the phenomena which physicists and biologists observe, there is a deeper realm of nature that serves to fundamentally interconnect all things (Wilber, 1982, p.2). He suggests that all matter, regardless of where it is located in space, is unified by some invisible collective fabric whose threads of interconnectivity are imperceivable to our ordinary senses. Bohm distinguishes between the *explicate* realm of separate things and events, and the *implicate* realm of undivided wholeness that is inherent and available to each part of the explicate (p.2). Bohm's notion of this transcendental order led to the birth of the *holographic paradigm*. The analogy of the hologram arose from neuropsychologist Karl Pribram's study of the brain. Pribram discovered that by cutting out small pieces of the brain, a particular memory could not be removed, only weakened. He hypothesized that memory was not located in a specific region of the brain, but rather was spread across the entire brain, with each piece containing the whole (Fraser, 1992, p.187). He compared this phenomenon to that of a holographic image which contains the entirety of its image in every part. Bohm developed the holographic paradigm to suggest that each brain functioning in the explicate order had access to the undivided reality of the implicate, transcendental order.

The notion of the whole in each part and each part as a whole is a plausible hypothesis given the mysterious underlying unity explored in nature's expressions thus far. The holographic paradigm provides a framework in which to consider the action-

at-a-distance of quantum particles, morphogenetic field theory, as well as the "know-how" that allows matter to form into complex structures. Unity in diversity and diversity in unity. This deep order, though still quite a mystery to us, is not altogether undetectable in our experience as human beings. The way in which we consciously partake in nature's complexity will be the subject of the next chapter.

## CHAPTER 4

### THE MATTER OF MIND AND THE QUESTION OF CONSCIOUSNESS

*There is an endless net of threads throughout the Universe.*

*The horizontal threads are in space; the vertical threads in time;*

*At every crossing of threads there is an individual, and every individual is a pearl.*

*The great light of Absolute Being illuminates and penetrates every pearl.*

*And also, every pearl reflects not only the light from every other pearl in the net,*

*But also every reflection of every reflection throughout the Universe.*

-Indian Vedas (as cited in Fraser, 1992, p.188)

#### 4.1 CONTINUING THE SEARCH

Understanding the complexity of nature is an exercise that is perhaps never ending. Thus far in the thesis I have attempted to highlight certain aspects of nature that contribute to our understanding of how physical life continues to evolve, as well as how it is organized. All creatures including humans essentially come from the same place and are composed of the same elements. We have seen how microcosms exists in some constant exchange with a larger macrocosm. Nothing exists in complete isolation from everything else. Exchange and interdependence are necessary prerequisites for life to continue. Moreover, we have recognized that physical evolution is not some half-hazard, random event that happens to stumble across order from time to time. Complex order is apparent at all levels of life as is life's

characteristic of imparting new information upon itself in order to contribute to still further development. Physical life at the quantum level has demonstrated an underlying interconnectivity where particles actually become one with other particles in a wave state, and where simultaneous faster-than-light communication takes place via a medium that transcends space and time in the unification of matter. Throughout the collage of languages that express nature, we are provided with evidence of pattern, order, interdependence, and above all, fundamental interconnectivity. Recognising what and who we are physically may help us to re-member our connection to physical life, and in doing so, come to appreciate our interconnectivity with the universe. Central to this thesis, though, is another way in which we may explore the interconnectivity of life. This is through the experience in nature that we refer as consciousness.

## 4.2 CONSCIOUSNESS AS THE FOUNDATION OF REALITY

In *The Self-Aware Universe*, Amit Goswami (1993) suggests that consciousness, not matter, is the stuff of which the universe is made, and describes his philosophy as *monistic idealism*, the antithesis of material realism. Goswami explains that his philosophy is monistic as opposed to dualistic, and that ideas and the consciousness of them are considered to be the fundamental elements of reality, including matter. Monistic idealism suggests that everything, including matter, exists in and is manipulated by consciousness (p.10). It is consciousness, according to this view, that brings matter into existence and orders it in a coherent and meaningful way.

Goswami suggests that the materialist framework is no longer sufficient to explain the recent discoveries in quantum physics. Consider the fact that a quantum object can exist at more than one place at a time (the wave property), that it is not able to manifest in space-time until we observe it (the collapse of a wave), and that the manifestation of one quantum object, caused by our observation, simultaneously influences its correlated twin no matter how far apart they are (action-at-a-distance). These are some of the principles that lend support to Goswami's theory of a pervasive, non-local consciousness (p.9). Monistic idealism posits that consciousness, the underpinning realm of reality, is responsible for bringing matter into existence by collapsing waves, and for non-locally providing a bridge between the particle pair acting simultaneously at a distance.

Goswami suggests that the domain which he describes as consciousness has been referred to repeatedly in idealistic literature. In the Vedanta literature of India, *Brahman* is the term used to describe the universal consciousness, the ground of all being which dwells beyond, *Maya* (illusion). In Buddhist philosophy *Dharmakaya* is the light of one consciousness which illuminates the realms of matter and ideas. The Kabbalah makes a distinction between *Theogony*, the transcendent order of reality, and *alma de-peruda*, the world of separation (pp.49,50). These diverse descriptions are examples of a wide philosophical belief in a transcendent domain of oneness that is the ground of all else. One is reminded here of the implicate and explicate orders of Bohm's holographic universe.

Goswami's view of non-local consciousness supports Sheldrake's notion of m-

fields. The possibility of frequencies, or a frequency domain, that carries species-specific information (either biological or other) is plausible since, as quantum physics has shown us, matter can somehow communicate with itself even when physically separated in space. The structure of such a domain where communication like this occurs is unclear to us, but the possibility of there being "group minds" or something like collective storage tanks for information and ideas in a universal realm of consciousness is plausible indeed.

Psychologist Carl G. Jung suggested that all members of the human species are participants in what he referred to as the *collective unconscious*, or the collective psyche (Jung, 1971, p.91). Similar to Sheldrake's idea of species-specific frequencies, the collective unconscious is a group mind that all individuals participate in and have access to. In this collective realm is stored universal archetypes that reveal themselves to individuals in the dreaming state. Jung believed each human being is born into the world with an inherent connection to this collective realm so that the images, ideas and symbols that are revealed to us in our unconscious state come from this shared domain. Jung writes,

The collective unconscious mind contains the whole spiritual heritage of mankind's evolution, born anew in the brain structure of every individual. His conscious mind is an ephemeral phenomenon that accomplishes all provisional adaptations and orientations, for which reason one can best compare its function to orientation in space. The unconscious, on the other hand, is the source of the instinctual forces of the psyche and of the forms or categories that regulate them, namely the archetypes. All the most powerful ideas in history go back to the archetypes. (p.45)

Jung further suggests that besides the collective psyche represented by the collective unconscious, there is also a collective psyche limited to particular races,

tribes and groups of individuals (p.94). Thus Goswami's belief that it is our conscious self that is unconscious of our unconscious, and the unconscious that is conscious all the time (Goswami, 1993, p.109) is similar to Jung's idea that we partake in the collective unconscious whether we are aware of it or not.

For Goswami, consciousness, which is the true foundation of reality, is always active and engaged in creation by bringing life into meaningful organization. If we accept monistic idealism, then it is reasonable to suggest that we are affected by this universal consciousness as it interferes with our subjective minds. Indeed, this capacity is explored, says Jung, when our sleeping minds visit the collective unconscious. Perhaps though, there are other ways in which our individual consciousness interacts with the collective consciousness of the creative universe. This idea is explored in the following section.

#### **4.3 TAKING THE "PARA" OUT OF PARANORMAL PHENOMENA**

It may well be that what we usually refer to as paranormal phenomena are in fact normal and natural experiences that manifest the interplay between individual and universal consciousness. Experiences such as telepathy, premonition and coincidence tend to be written off as random chance events lacking empirical validity according to the mechanistic paradigm. But are experiences such as coincidence as random and meaningless as we tell ourselves they are, or could it be instead that they are significant and meaningful events in our lives resulting from some underlying order in

the universe? In light of recent developments in science which I have explored throughout this thesis, experiences usually referred to as paranormal are beginning to find "ground" as real events in nature. To illustrate the kind of experience I am referring to, I will provide an example of meaningful coincidence from my own life to serve as a reference point for this discussion.

As I was contemplating this section of my thesis, I was feeling slightly frustrated since it seemed like a long time since I had had the kind of experience which I was eager to write about. Although I could have written about the subject from memory of a past coincidental event, I wanted a concrete experience to help inspire my writing. Knowing that I could not force such an experience, and feeling sceptical that it would occur "on command", I took a few days off in order to take care of some other personal matters. In those four days, something very interesting happened. On the first day I had been talking with a colleague about the nature of the work that we had been doing in the shelter for homeless youth. As we discussed "our kids", my colleague happened to remark that for her they were all "des petits princes" referring to the book *The Little Prince* by Antoine de Saint-Exupery. Having read the book many years ago in school but not remembering its content, I asked her to explain what the book was about. My colleague, however, chose not to tell me about it and instead suggested that I read it myself. Being, as I was, in the middle of my thesis writing, there was no way I imagined reading the book any time soon. The next morning I was having breakfast while reading the local paper. Oddly, *The Little Prince* was mentioned in an article discussing the beauty of imagination. A small coincidence,

I thought, but nothing that really blew me away. It was later that afternoon that things began to get somewhat more bizarre, and exciting. I was walking down the street and decided to stop into a gift shop since I was looking to buy a present for a friend who was getting married. This shop sold clay products which you were able to paint in the store. As I walked in, I noticed an old friend sitting there whom I had not seen in a long time. After our initial greeting, I bent down to see what he was painting on his clay mug. It was a picture of a boa constrictor digesting an elephant, an image taken from the book *The Little Prince*, he told me. At that moment I was overwhelmed by that familiar cosmic feeling again and knew that these separate events involving this book were not random or merely coincidental. Though the significance of these events was unknown to me, I was enchanted nonetheless and felt that somehow the universe had been responding to my somewhat naive desire to experience some "magic". The following day I was having dinner with a friend who was recounting his adventures in Ecuador where he had just spent some time recently with an Aboriginal family. There was a young boy in the family who was so enchanted with life and curious about everything that he immediately made my friend think of *The Little Prince*. This was too much and I was overjoyed with the string of events involving this particular book. I knew at that moment that the message for me in these events was that I should read the book as soon as possible. When I arrived home that evening, I found that I had actually kept an old copy of *The Little Prince* and decided that it would be my new bedtime reading for a while. Surely enough the simple story was inspiring and reminded me again of the beauty life holds, and of our good fortune to take part in it.

The character in the book reminded me how to relax at a time where I was becoming very stressed about deadlines and recent changes in my professional life. *The Little Prince* helped to rekindle the child in me who was excited and fascinated about the beautiful complexity of life. Not only did I find the inspiration to continue writing, I also had the example I was looking for to introduce this section!

Meaningful coincidences of the sort I have just described happen all the time. Who has not thought of someone they haven't seen in a long while only to "coincidentally" run into them the following day, or thought about someone only to have them call a short while after? It is difficult to imagine that these events are somehow correlated. After all, how can completely unrelated events have any bearing on one another?

Carl Jung referred to meaningful coincidences as *synchronicities* which are events between the physic and the psychic that are related to one another in an *acausal* way. Synchronicity here means "the simultaneous occurrence of a certain psychic state with one or more external events which appear as meaningful parallels to the momentary subjective state - and, in certain cases, vice versa" (Jung, 1973, p.25). Jung distinguishes acausal events from causal ones in that the latter occur as a result of causal chains, or cause and effect relationships, whereas the former cannot (as yet) be related to any specific causal relationship, and so are more a result of what he calls meaningful *cross-connections*. For Jung, to relegate such an experience to the category of mere chance would be to "violate its most salient feature - its significance" (Fraser, 1992, p.169). According to Jung, causality is only one possible pattern of order at

work in the universe. He suggests that meaningful coincidences may actually be events that are related to one another in a way that we do not necessarily understand.

Causality is more accepted than the notion of acausality since it is the one that is most easily identifiable quantitatively. There is nothing to prevent us from believing, Jung suggests, that there is another state of order at work where events come together in qualitatively meaningful parallels. Any bias we might have concerning the possibility of alternative conceptions of order may be evidence of the triumph of "hard" science in Western culture. On this subject Koestler writes,

Whether one believes that some highly improbable coincidences are manifestation of some unknown principle operating beyond physical causality...is ultimately a matter of inclination and temperament....I have found...that the majority of my acquaintances - among whom scientists predominate - are inclined towards the first alternative, although some are reluctant to admit it, for fear of ridicule, even to themselves. (cited in Fraser, 1992, p.173)

In 1919, Austrian biologist Paul Kammerer proposed an acausal theory to explain meaningful coincidence (p.175). Kammerer suggested that similar objects and events tend to cluster in patterns, just as spatial bodies are attracted to one another under the influence of gravity. Like Jung, Kammerer believed that coincidences were the manifestation of an underlying harmony or unity.

What of the question of telepathy? Does the fact that, while in Israel I dreamt that my mother in Montreal was telling me that something terrible had happened to my maternal grandfather, only to find out the next day that my paternal grandfather had actually died, suggest a meaningless chance event, or might she have actually communicated this slightly jumbled message to me overseas? Jung suggests the

existence of a collective unconscious, a deeper level of consciousness that all human beings have access to. This idea is akin to Sheldrake's theory of m-fields that says that organisms are tuned into a collective frequency. Given the fact that elementary particles span the universe in a wave state reaching outward, as American physicist Henry Stapp suggests, to other things (p.178), while particle pairs demonstrate their ability to communicate information to one another across space and time, is it so unreasonable to hypothesize that at some level of reality there is an underlying order that enables human consciousness to participate in similar activity?

Furthermore, the fact that observer participation has an effect on the state of a particle suggests that a conscious participant can affect the matter of the universe. Is it then so implausible to hypothesize that at some level, our interaction with the universe may bring about events that correlate with our psychic states?

I am not suggesting that the nature of mind necessarily operates in a way that is equivalent to the functioning of quantum particles, but rather, that there is good reason to believe that there is some system at work in which ideas may be carried through some network that we do not yet understand. Science offers a possible explanation of such a phenomenon. Fraser supports this idea when she writes,

Of course, the discovery of the acausal principle or a mechanism akin to telepathy on the quantum level does not 'prove' their operation in the ordinary sensory world; however, it does demonstrate that such principles are not abhorrent to nature. This, in turn, allows at least for the possibility that individuals or events might, under special circumstances, partake of this deeper reality, resulting in phenomena that may be judged paranormal. (p.181)

Though events judged "paranormal" still remain a mystery, we have at least

some evidence to support their validity and get us thinking more about their profound importance with regard to our capacities as conscious creatures. The consideration of events of consciousness provide us with more room to manoeuvre in the exploration of our identities as interconnected participants of life.

#### 4.4 ENGAGING THE WEB OF LIFE THROUGH PRAYER

In *Healing Words: The Power of Prayer and the Practice of Medicine*, Larry Dossey, M.D., explores the relationship between the psychic and the physic with regard to the question of prayer. In his book, Dossey (1993) makes the case for a new conception of medical education that incorporates prayer as a possible tool to aid in the process of healing. Dossey writes,

The message of modern medical education is clear: one must choose either logical, analytical, and rational approaches, or irrational, religious, superstitious, and 'right-brained' ones, which include prayer. But the choice between science and spirituality appears increasingly artificial today, even from a scientific perspective. It is now possible to tell a new story, one that allows science and spirituality to stand side by side in a complementary way, neither trying to usurp or eliminate the other. (p.xx)

In his search for studies about the effect of prayer on healing, Dossey discovered over one hundred experiments that had been carried out under stringent laboratory conditions, over half of which demonstrated that prayer had an effect on a variety of living organisms (p.xv). Some of the subjects included in the experiments were human beings with various ailments, enzymes, bacteria, cancer cells, plants, algae, and mice. Several processes were also studied including the growth rate of

various seeds, the healing rates of wounds, the size of tumors and the mutation rates of bacteria (p.xviii). Despite the extensive scientific literature that Dossey found supporting the effectiveness of prayer, these findings did not appear to be common knowledge among medical practitioners. Dossey suggests that the subject of prayer was for the most part unacknowledged because it did not fit within the prevailing ideas of Western science. In such a case, "(a) body of knowledge...can be ignored as if it does not exist, no matter how scientifically valid it may be. Scientists...can have blind spots in their vision. The power of prayer, it seemed, was an example" (p.xv).

Dossey explains prayer as the intentional focus of one's thoughts toward the end of affecting some change in the state of physical life. He distinguishes between prayer that is *directed* and prayer that is *nondirected*. Directed prayer occurs when the praying person, or pray-er, has a specific goal or outcome in mind that s/he attempts to influence by directing his/her thoughts in a precise direction. For example, a practitioner of directed prayer may be praying for a cancer to be cured, a headache to go away, or a heart attack to resolve itself (p.97). Nondirected prayer, on the other hand, "is an open-ended approach in which no specific outcome is held in the mind" (p.97), and where the praying person engages "a simple attitude of prayerfulness - an all-pervading sense of holiness and a feeling of empathy, caring, and compassion for the thing in need" (p.xvii). In some experiments where nondirected prayer was employed, the results were twice as great as those in which directed prayer was used.

Dossey cites the study done by the Spindrift organization in Oregon, demonstrating the effectiveness of nondirected prayer. Spindrift devised an experiment

involving the growth of mold on a rice plate. The mold was washed with an alcohol rinse to retard its growth without killing it, and a string was placed across the center of it to mark side A as the control side and side B as the prayed-for side. When directed prayer was used to enhance the growth of the mold, nothing happened. However, when directed prayer was replaced by nondirected prayer in the mind of the pray-er, side B "began to multiply and formed additional concentric growth rings" (p.98).

Furthermore, Dossey's studies suggest that the distance between the pray-er and the prayed-for had no affect on the healing power. This supports the idea that prayer is "non-local", and since it arises from our mental actions, suggests that some part of our own psyche is also non-local. These experiments provide support for Goswami's philosophy of monistic idealism. Further evidence of non-locality has been demonstrated in experiments where an object is affected by prayer even while being sealed in a lead-lined room that shielded it from all known forms of electromagnetic energy (p.xviii). This phenomenon is reminiscent of the *Tunneling Effect* that occurs with subatomic particle/waves. When a physicist attempts to contain a single electron by isolating it within a box, the electron will gradually "leak out", defying all the forces attempting to hold it in, and "tunneling" through the wall. As Griffiths (1989) suggests, the electron "transcends itself, in a sense, to fill the entire universe" (p.18). These findings provide information that may help us to move out of the paradigm that saw the human being as a local entity, existing independently in a mechanistic and linear world. Dossey's studies as well as those in physics provide evidence that nature

is non-local, and that channels are open, linking every part to the whole.

Here I would like to recount an experience in my own life that may possibly have been evidence of the channels of prayer that Dossey discusses. Almost four years ago, my maternal grandfather was admitted to the hospital as he had been suffering from severe abdominal pain. During his stay of just over a month, I had slept beside my grandfather's bed every night in order to provide him with company and assistance. Several x-rays revealed that my grandfather had developed numerous lesions on his liver that the doctors told us might be cancerous. I was told that my grandfather would never leave the hospital. "Coincidentally" at this time I had just begun to discover Dossey's work on prayer. Each night I would lie next to my grandfather and imagine his liver and abdominal area enveloped in white light, healing itself. A close friend of mine also prayed for my grandfather's health from her home during her nightly meditations. After three long and difficult weeks at the hospital, my grandfather seemed to stabilize and my family decided that we would bring him home and care for him there so that he might, at least, be more comfortable. Just prior to our departure from the hospital, my grandfather's doctor decided to have one final x-ray taken. Mystified, the doctor told us that all of the lesions on my grandfather's liver had disappeared without a trace. Almost four years later, my grandfather will be celebrating his ninety-third birthday.

Could the praying that I and my friend did for my grandfather have affected his healing process? After studying the effect of prayer on numerous life systems, Dossey now feels that to not employ prayer with his patients is the equivalent of

withholding a potential drug or important surgical procedure (p.xviii). Though his studies may provoke an important reconsideration of the way that we educate about, and conduct, medicine, Dossey's findings with regard to prayer also reveal something profound about nature and our place in the universe. Dossey writes,

Prayer says something incalculably important about who we are and what our destiny may be....(P)rayer is a genuinely nonlocal event - that is, it is not confined to a specific place in space or to a specific moment in time. Prayer reaches outside the here-and-now; it operates at a distance and outside the present moment. Since prayer is initiated by a mental action, this implies that there is some aspect of our psyche that also is genuinely nonlocal. If so, then something of ourselves is infinite in space and time - thus omnipresent, eternal, and immortal. (p.6)

The phenomenon of prayer supports the principles of nature discussed in the thesis. Prayer and nonlocal consciousness fit very well within the science's new vision of reality. An investigation into the nature of consciousness is not limited, however, to those experiences which demonstrate the psyche's effect on matter. There is yet another approach that sheds light on the way in which consciousness may act upon itself. This is an important avenue to explore since it provides the human being with an active seat in his/her own process of being and becoming, and reinforces the knowledge that the healthy formation of our individual identities depends upon the conscious awareness that we exist in a relationship with a reality that extends beyond the self. It is here that I wish to explore the patterns of consciousness as discussed by Canadian Jesuit philosopher and theologian, Bernard Lonergan.

#### 4.5 MAKING THE SELF: EMPLOYING NATURE'S RHYTHMS IN THE QUEST TO BECOME MORE FULLY HUMAN

Lonergan's discussion of self-consciousness is vast and covers a plethora of ideas relating to the process of becoming an authentic individual. For Lonergan, one fundamental component of moving towards authenticity involves the process of self-transcendence. This process is a dynamic one which enables the self-transcending subject to live with a keen desire to reach for, and create value in his/her life.

Lonergan explains that the desire to discover one's authenticity is a natural human endeavour that provides an individual with access to his/her self-creative capacities.

(A)s children we must be persuaded, ordered, even compelled to do what is right. But as our being is becoming, a degree of autonomy gradually appears, and we want to do, decide, and discover things for ourselves....Tragically, our desire...to do things for ourselves quickly outruns our ability to reasonably judge and responsibly decide for ourselves. Still, despite the time and pain involved, we do gradually grow in knowledge and develop our response to value; we become more and more ourselves, straining toward authenticity. (Gregson, 1988, p.49).

As we shall see, becoming an authentic self involves practicing a certain attention or presence to human values. Lonergan explains that "(w)hen we ask whether this or that is worth while, whether it is not just apparently good but truly good, then we are inquiring...about objective value. Because we can ask such questions, and answer them, and live by the answers, we can affect in our living a moral self-transcendence" (Lonergan, 1972, p.104). Values provide a horizon in which one may enter into a space where s/he may contribute, through his/her own moral living, toward the creation of what is good for our collective existence. Participating in the good provides a way for the individual to live a meaningful life with the knowledge that

his/her actions contribute to the movement of a reality that extends beyond the self.

Lonergan provides a methodology through which one may engage the process of becoming an authentic, self-transcending being. Here he draws attention to four successive stages of cognitional activity that build a bridge to a fifth where communion with a higher or deeper level of reality is attained.

The first stage in Lonergan's method is that of *experience*. I am able to hear, touch, taste, smell, see and all the rest that compose my senses. Though experience in itself does not make me self-aware, together with the second level of consciousness which Lonergan calls *understanding*, my relationship with the world, and myself, becomes somewhat more complex. At the level of understanding, I entertain ideas and thoughts, and begin to seek out explanations for the things that I experience. The next level of consciousness is *judging*, where I try to rationally grasp the truth of what has really occurred in my experience. Through reflection, I attempt to distinguish between what is accurate and inaccurate in my understanding. At this level, I am essentially judging what is true, and in doing so, becoming a rational subject. Once I have acquired the ability to be rational and reasonable then I may move on to the fourth level of *responsibly deciding*, in which I become a free agent who, by my voluntary choices, creates myself and the context in which I live (Gregson, 1988, pp.18,19). At this stage I have attained moral consciousness where values underpin my decision-making. Lonergan writes,

If one wakes, one becomes present to oneself, not as moved but as moving, not as felt but as feeling, not as seen but as seeing. If one is puzzled and wonders and inquires, the empirical subject becomes an intellectual subject as well. If one reflects and considers the evidence, the empirical and

intellectual subject becomes a rational subject, an incarnate reasonableness. If one deliberates and chooses, one has moved to the level of the rationally conscious, free, responsible subject that by his choices makes himself what he is to be and his world what it is to be. (Crowe, 1989, p.37)

In the process outlined above, each successive stage is necessary in order to attain the next. Without experience, one could not attempt to understand one's experience, and so on. Moreover, any preceding stage is never lost but is sublated into the next so that "something new and distinct is introduced" while preserving the properties of the original stage and carrying it forward "to a fuller realization within a richer context" (Lonergan, 1972, p.241). For example, when I seek to understand, my experience *of my experience* never disappears but is brought to a new level, as it is with my quest for understanding when I reflect on whether or not what I understand is true. The latter levels of consciousness would not be possible without the former ones. This is a pattern that we must attend to in most cases, says Lonergan, if we desire to attain a level of responsibility. But what is the value of being responsible and why should it be something that is desirable?

This question is answered when we explore the implications of deciding responsibly in the fourth level. Responsibility enables the individual to become free to choose. Choosing responsibly is the key here, since it is also possible to choose irresponsibly. When one chooses responsibly, a creative action takes place that both affects the development of the individual as well as the context in which s/he lives. Being authentically responsible follows from one's decision to act upon what is good, after having deliberated over the matter in the three preceding stages of consciousness.

The term *good*, however, needs to be defined more carefully. For Lonergan,

the good arises out of what we know by way of our morality. The human spirit, according to Lonergan, does not exist alone, but rather in relationship with God (p.103). Our moral centres provide us with inherent "compasses" which help to guide our thoughts and actions toward what is in creative harmony with the divine. To read this compass, one needs to follow the process that Lonergan suggests. Thus the good is what attunes us to divinity and is recognized by our sense of morality. For Lonergan, the desire to be authentic and to seek what is good is the result of a conscious intentionality on our part to be fulfilled as human beings. The human spirit, according to this view, is naturally drawn to seek some kind of communion with God. This point is made more evident when we explore the various terms that Lonergan uses to describe the level of responsibility in *Method In Theology*.

The fourth level of responsibility is also referred to as the "existential"(p.35), the level of "moral self-transcendence and in that sense of existence, of self-direction and self-control" (p.121). Lonergan goes on to call this level "the level for the exercise of vertical liberty" (p.40) as well as "the level on which consciousness becomes conscience"(p.268). As a result of engaging this level, Lonergan suggests that "we emerge as persons"(p.10) and says that "a man is his true self inasmuch as he is self-transcending"(p.357).

We understand then that being responsible has far reaching implications. It allows us to make good decisions, but in doing so moves us into a space where we become more fully human through the act of self-transcendence. When we choose the good, we are no longer acting only on our own behalf, but are partaking in a

relationship with God and, as Lonergan puts it, creating our very selves and the world we live in.

The levels of consciousness that are outlined in Lonergan's method enable us to see a *pattern* through which we may attain greater awareness of our being. Although the fourth level is the one which brings us into communion with the divine by the act of self-transcendence, the process does not end there. For once one has entered into the space where intentional morality is present and practiced, one is never the same again. There is a shift that occurs at the fourth level that now affects the other three, each time around. That is to say, when one has a conscious desire for moral fulfilment through the act of authenticity, one's experiences are experienced in a new way, one's understanding is illuminated with new insight while one's reflections are based upon a new set of criteria. As a result, the responsible choices one makes, serve once again to substantiate and solidify one's morally authentic being. Each time one applies this process of self-transcendence, the quality of one's consciousness is enhanced. In this way, the dynamism of the human spirit engages in the self-correcting process of human learning.

Lonergan suggests that the practice of his method has the effect of bringing the individual into a relationship with the divine. He writes, "be attentive, be intelligent, be reasonable, be responsible, be in love" (p.268). The notion of love follows from the fourth level and implies being in a morally conscious communion with God, or essentially, being in love with God. Lonergan discusses this idea:

(B)eing in love with God is the basic fulfilment of our conscious intentionality. That fulfilment brings a deep-set joy that can remain despite

humiliation, failure, privation, pain, betrayal, desertion....(T)he absence of that fulfilment opens the way to...the harshness of human life arising from the ruthless exercise of power, to despair about human welfare springing from the conviction that the universe is absurd. (p.289)

Acknowledging the fact that various religions and cultures have referred to the love of God in different ways, Lonergan makes the point that there is indeed some universal, transreligious experience that underpins all definitions. He writes that in the myriad interpretations of what it is to be in love with the divine there "exists an unrestricted being in love, a mystery of love and awe, a being grasped by ultimate concern, a happiness that has a determinate content but no intellectually apprehended object" (Crowe, 1989, p.97). Though Lonergan talks about being in love with God, we are free to use any term we are most comfortable with to describe the divine domain that he speaks of. What is important is the realization that Lonergan's method for self-transcendence opens a doorway into a relationship with a profound level of reality that extends beyond the self. In this relationship one finds meaning, direction, and an authentic identity rooted in the practice of community.

Lonergan's method demonstrates the transformative power of consciousness. As Gregson puts it, "(a)s we consciously move from level to level, not only are our operations different, we ourselves are different....Whenever we act, our own character is formed as well" (Gregson, 1988, p.20). Being attentive, intelligent, reasonable, and responsible provides us with tools that help us understand who we are, and who we ought to become. Moreover, forming an authentic identity with the knowledge that we participate in a greater community, is an idea that is central to this thesis. Though

Lonergan's method provides us with insight into the operations of our mind, there is a curious resemblance between the principles of consciousness he proposes, and the principles of matter found in nature.

The principles of nature that have been explored throughout this thesis demonstrate how physical life systems evolve into greater complexity through the process of feedback. These systems take in information or elements from their environments and incorporate them into their own complexity, often giving rise to emergent properties which bring the original system into an extended horizon. Moreover, when any system is broken down far enough, pattern appears to be the underlying current which provides the framework for the system's structure. Science has also demonstrated that no thing exists in complete isolation. Any entity is a complex arrangement of sets of relationships that have some interconnection to the web of life.

Consciousness seems to adhere to very similar principles. According to Lonergan, an individual moves toward authenticity by entering into a process of transcendence where each level of consciousness affects the next until the cycle is repeated - much like a feedback loop. With each successive exercise of this process, the consciousness of the individual becomes changed, enhanced in some way, such that the individual exists in an enriched horizon. The development of one's consciousness, from Lonergan's perspective, depends for the most part on a patterned method of self-transcendence. Adhering to pattern in the sense of recognising the movement in the levels of one's consciousness, enables one to see how their mind

operates, thus providing an opportunity for agency in their own becoming. Becoming is not accomplished in isolation, however, but in community that tends to stem out of a more profound, unified dimension of reality - an idea that science has revealed to us in a variety of ways. Consciousness, then, is yet another realm of nature that fits within the interconnected vision of reality which is emerging within the new science.

## CONCLUSION

This thesis began with the claim that contemporary approaches to education in the West fail to address certain dimensions of the human being that are vitally connected to one's experience and sense of place in the world. As a result, the act of learning is robbed of qualities that might otherwise contribute to a deepening of wonder, imagination and creativity in the life of the learner. Authors such as Keen, Palmer, Smith and Elkind have all expressed concern over the disenchantment that characterizes education today. Each of these authors has in some way suggested that education fails to invite the student into an intimate relationship with the world and self. Indeed, one might say that the practice of pedagogy has in large part become mere training meant to equip students with certain skills necessary for survival in the marketplace. Rachel Naomi Remen, M.D. (1999) reflects on this idea when she writes that "An education evokes wholeness and attends to integrity, while a training specializes, focuses, and narrows us. And in specializing, we disavow parts of our wholeness. We sacrifice our wholeness for expertise" (p.36). This view suggests that what is often regarded as education today may in fact be "mis-education" since it teaches us not to strive for wholeness and a sense of participation in the world, but rather encourages us to develop a kind of tunnel-vision which restricts us from discovering and creating beyond a very limited view of what it means to be human. Inviting a re-discovery of what the practice of pedagogy ought to be, Remen reminds us that the root of the word *education* is *educare*, meaning

'to lead forth the hidden wholeness,' the innate integrity that is in every person. And as such, there is a place where 'to educate' and 'to heal' mean the same thing. Educators are healers. Educators and healers both trust in the wholeness of life and in the wholeness of people. Both have come to serve this wholeness (p.35).

Before offering a remedy for the dis-ease that education suffers from today, I have attempted, in this thesis, to first draw attention to one of its primary causes. The disjunctive experience of education is rooted to a large extent in a worldview shaped by the mechanistic philosophy in science. According to this view, reality is understood as a series of detached parts whose only relationship is to be found in the less-than-meaningful interactions between cause and effect. Here "The acid test of existence is quantifiability, and there are no more basic realities in any object than the parts into which it can be broken down" (Berman, 1984, p.34). As Griffiths has pointed out, the mechanistic paradigm replaced what he refers to as the perennial philosophy which held that the material world was pervaded by, and would find its explanation in, a transcendent reality. The mechanistic worldview replaced the question of "why" with the question of "how". As such it shut the doors to the interconnection that exists between people and nature. It shaped a worldview which saw humans as spectators and controllers of the physical world. This thesis maintains that the atomistic ideology introduced by the discipline of classical science has, to a large extent, been responsible for the fragmentation that is so prevalent in Western pedagogy today.

As Miller and Wood have suggested, education must recognize and begin to seek out the spiritual dimension of human experience that has been eclipsed for too long. Taylor presents evidence of a growing desire to reclaim the spiritual experience

of life in a variety of expressions. The primary aim of this thesis has been to identify one avenue of study through which the vista of spirituality education may be opened up. Ironically, the same scientific framework which once steered away from metaphysical questions of "why" in favour of the question "how", has now, almost surprisingly, led us anew into the forum of metaphysical contemplation. Now, however, it is becoming obvious that the "how" and the "why" are not mutually exclusive but rather complementary as our understanding of reality continues to unfold.

The study of physical nature explored throughout this thesis demonstrates that life is fundamentally an interconnected whole. The composition of matter itself, the patterns it operates by and the processes it adheres to all help to explain how life extends into itself in such a way as to continue to sustain itself while setting the stage for ever greater complexity to arise. What was once thought to be a collection of isolated parts is now being recognised as an integrated whole made up of elements whose unique qualities exist by virtue of their relationship to the greater whole. In the language of Wilber, the universe is made up of holons. Moreover, the philosophy of science has opened doors to the consideration of questions relating to the nature of consciousness. Research in the field of prayer and other areas of metaphysics suggest that interconnectivity may not only be evidenced at the level of matter, but also at the level of mind. Bernard Lonergan's work suggests that individual consciousness may be attuned by its subject to create a life in pursuit of values, and in so doing, engage in thought patterns that actually reinforce the structure and integrity of that subject's

consciousness. Notably, such an engagement cannot happen in isolation, but requires the subject's conscious and conscientious consideration of others and the world. This idea is particularly interesting to me since it offers the human participant agency in the duality of his/her individual/communal identity. With regard to the philosophy of science, Lonergan's work raises further questions concerning the relationship of matter and mind. If the parallels between his methodology and the patterns of physical nature are any indication, then science may potentially offer us important "blueprints" into the nature of consciousness.

With the help of disciplines such as quantum physics and biology, we are now learning how to read the "roadmap" of an interconnected universe. It is no longer quantifiably possible to argue against a holistic nature. Science itself has resolved this "matter". This has important educational implications. As we have seen, the practice of education in the West is in need of a spiritual transfusion. Perhaps one viable way of introducing the "interconnected universe" into the curriculum in such a way as to promote and nurture the profound spiritual dimension of living, is to frame it in a story, or narrative. For Postman (1995), such a narrative should have "sufficient credibility, complexity, and symbolic power to enable one to organize one's life around it" (p.6). To suggest that insights gleaned by science serve as stories for the spirit seems quite plausible given that science is not about nature "out there" but rather "right here", in and between and through us. To some extent this is already occurring. In the introduction to *The Heart of Learning: Spirituality in Education*, Steven Glazer (1999) notes that the section of the book titled "Relationship and Community" is

rooted in part in Ken Wilber's notion of holons. The idea of holons provides a context for education to articulate the experience of wholeness "more fully and usefully into our classrooms and lives" (p.4). Additionally, Sahtouris (1989) has woven Lovelock's Gaia theory into a story that clearly allows the reader to situate him/herself in the ongoing movement of life and creation. By addressing the science of Gaia, Sahtouris is able to open a space for the consideration of specific spiritual and practical human concerns - concerns that in some way or other overlap. Sahtouris writes,

These undervalued concerns and activities, the respect for and love of life, are what will heal the world if they are recognized and acted upon, not just among individuals and in homes, but in our greater society as well - in economics, politics, even science (p.246).

In *The End of Education*, Postman (1995) presents a narrative which he calls "The Spaceship Earth" (p.93). Here he offers the "fictional" story of a city in turmoil where pollution, crime, disorder and rudeness threatened to bring an end to civilised life. "The schools were run down, and no one believed in them...The young fought the old. The workers fought the students. The poor fought the rich. The city was bankrupt" (p.93). Slowly but surely students were called upon, through legislation, to take part in the city's daily services from daycare to mail delivery as well as to orchestrate a variety of other civic responsibilities. With everyone's participation, the state of emergency eventually subsided and a sense of peace was restored in the land.

Postman's narrative is meant to illustrate, for one thing, that students need to be given the opportunity to participate meaningfully in their environments. By taking part in the maintenance and care of their schools, planting flowers or producing community

newspapers and theatre, students may learn to become more conscious of their interdependence and discover a sense of responsibility which ensues from that consciousness. The narrative of "The Spaceship Earth" is meant to offer students a sense of participation, not only in some larger context, but a context in which they feel a sense of place, participation and meaningful responsibility. This narrative, therefore, is ethically rich and could also serve as the basis for a meaningful approach to moral education.

Considering the nature of interconnectivity explored in this thesis, I believe it is possible to contribute an additional dimension of depth to Postman's script. With the help of scientific insights, it is now possible to anchor the value of civic or even planetary responsibility to the depths of the quantum and perhaps beyond. The value of this lies in students' ability to concretely grasp the knowledge that they are, *a priori*, interrelated to all life. By framing the curriculum, and indeed the spectrum of education entirely, in a narrative through which the experience of interconnectivity may be contemplated and felt, educators may begin to approach traditional subjects with a re-newed perspective. Math, chemistry, biology, geography and the rest no longer need remain compartmentalized bits of information hovering above but away from the experiential world of the learner. Instead, they may come to be recognized as languages or expressions of an interconnected experience that is in reality trans-disciplinary and phenomenological.

A narrative rooted in the notion of the interconnected universe would also enable learners to reflect on their experience of the world in a new way. Rather than

seeing ourselves as individuals detached from others and the world around us, we may begin to construct an identity, or a new sense of self, that is rooted in the individual/communal duality. Keen (1990) writes,

When the self is single, when 'one is one and all alone and ever more shall be so,' the burden of loneliness and transcendence is too great to be borne. If my identity is limited to my self, my total reality is defined by the time which lies between my birth and my death and the space through which my body travels. Solipsism is despair. The atomic self is defenseless before death. Therefore in order to escape death and despair, a pathway beyond the self must be found, some way of getting outside the self (p.77).

As we have seen throughout this thesis, nature exists as a constant interplay between the one and the many. It no longer makes sense to consider any one system of life in complete isolation to any other. The human organism is no different. With the knowledge that our bodies originate from a common source, that our particles and electrons are in constant exchange with one another's, that we participate in the great Gaian system of life, we may begin a conscious re-awakening of the part of ourselves that is rooted in community. One is never really alone. Moreover, metaphysical expressions of interconnectivity open a space in which the individual may consider new enchanting ways of engaging the world. One's identity may now take root in the knowledge that both one's physical and mental self extend beyond the immediate subject and into the whole of life.

Keen's *To A Dancing God* criticized education for neglecting the imaginative, creative and reflective capacities of the individual, capacities which are fundamentally necessary if one is to develop an authentic identity. By obscuring these qualities, education has lost a sense of substance, depth, vision and enchantment. By

approaching education anew with the knowledge that it has the potential to honour our interconnected nature, individuals may reclaim the depth dimension of their identities with the recognition that the world is not "out there", but literally "running through their veins". With this knowledge, one is free, even encouraged, to care, hope, love, identify, dream, wonder, empathize and create in a meaningful way. Knowing that one's thoughts and actions will affect the world they participate in, one is offered a horizon in which to purposefully practice responsibility in one's living. As we reconstruct a spiritual narrative underpinned by a philosophy of science which returns the creative learner to a world that is interconnected and holistic, we may finally begin the process of re-enchanting education, of reviving the spirit in the practice of pedagogy.

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