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Reconstructing Educational Experience: A Postmodern Perspective.

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RECONSTRUCTING EDUCATIONAL EXPERIENCE:  
A POSTMODERN PERSPECTIVE

A Dissertation

Submitted to the Graduate Faculty of the  
Louisiana State University and  
Agricultural and Mechanical College  
in partial fulfillment of the  
requirements for the degree of  
Doctor of Philosophy

in

The Department of Curriculum and Instruction

by

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May 1996
DEDICATION

This work is dedicated to the Glory of God in thanksgiving for Grace received and in memory of my grandfather, my father, and my son. I bear the French feminine of my grandfather’s name, John, which means God is gracious. Though its foreign pronunciation was a trial for me as a child, it is a name I am grateful for today. My father Joe, who died when I was ten, planted in me the seeds of both/and thinking while I was very young. He often said, “There is the right way, the wrong way, and the hard way” or “there is a right way, a wrong way, and Joe’s way.” And my son Trey, who died at the age of twenty-three in the midst of my doctoral studies, taught me the power of God’s grace. Trey’s life was, and is, a blessing to me, his death a tragedy that only God’s grace has enabled me to endure. Reflecting on his life and his death has taught me the importance of both/and thinking and enabled the reconstruction of experiences so as “to turn the negative into something positive, tragedy into a triumph, a predicament into an achievement on the human level” (Frankl, 1988, p. 137).
ACKNOWLEDGMENTS

This dissertation is not the product of a mechanistic, cause-effect process. Rather it is evidence of double-agency -- God acting in the world through freely chosen human actions. My understanding of God and God's Grace comes most often through relationship with others. I owe greatest and deepest thanks to Ed, my husband, love, companion, friend and anchor in reality these last thirty years. Without his dedication and strength, support and sacrifice, not to mention listening, reading, and conversations, this doctoral process would never have been completed. Indeed, without his encouragement of my growth, it would never have begun. I also wish to thank my dear daughter Ashley who has also endured the day-by-day dissertation process. Her enthusiasm, frequent insights and helpful phrases, as well as tedious household assistance have been a blessing.

One can never thank all those directly and indirectly related and interrelated to the completion of a piece of work, but I would like to thank helpful friends, colleagues, and co-workers, particularly the numerous graduate students who started both before and after me in the process. Shared experiences have both enriched my work and supported my efforts. Thanks to Molly, Ann, Elaine, Francis, Al, John, Steve, and particularly Denise. Special thanks to Judy B. for thirty years of friendship as well as all the forms her help has taken. Thanks to Gaile, especially for her prayers and Carlos for his patience and technological support. A specific thanks to Lois, in the C&I office. She serves as a knowledgeable and helpful advocate for graduate students, providing a sense of continuity and security, especially during times of our greatest administrative stresses. I would also like to thank three professors who assisted the dissertation process. Ann Trousdale I thank for her very
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ABSTRACT

Education in America today is dominated by the either/or thinking of modernism. This mode of thought is connected to both the concepts and methods of modern, mechanistic, Newtonian science. However, the attendant reductionistic methodology has been elevated beyond its realm of efficacy to the level of a world view, a metaphysical level. This is demonstrated by the omnipresence of the machine metaphor in all areas of human endeavor. The machine is the root metaphor of modernism.

John Dewey speaks of a “new order of conceptions” necessary for significant change. These new order concepts are manifest in the new or postmodern sciences. Classical science focuses on cause/effect, linear relationships and determinate order; whereas, postmodern science includes the indeterminacy principle and non-linear relationships. Either/or thinking is a narrow conceptualization of modern science. What I refer to as both/and thinking incorporates concepts from both classical and quantum physics, modern and postmodern science and recognizes they cannot be reduced one to the other -- both are essential. Both/and thinking is needed to understand Dewey’s concepts for reconstructing education.

Metaphor is considered both a figure of speech and a mode of thought. Metaphorical thought serves as a vehicle for moving from the unknown to the known. It is pivotal in both/and thinking; metaphors are themselves irreducible, yet can lead to areas of precise inquiry. A postmodern metaphor for a theory of education is offered in order to present concepts that go beyond those comparing humans with machines. The interrelatedness of metaphor to theory and theory to practice are discussed. Practical applications conclude the work.
CHAPTER ONE
INTRODUCTION

Life is a self-renewing process.... ‘Life’ covers customs, institutions, beliefs, victories and defeats, recreations and occupations....Continuity of life means continual readaptation... Education, in its broadest sense, is the means of this social continuity of life. (Dewey, 1916/1966, p. 2)

To learn to be human is to develop through the give-and-take of communication an effective sense of being an individually distinctive member of a community. (Dewey, 1939, p. 389)

The keynote of democracy as a way of life may be expressed...as the necessity for the participation of every mature human being in formation of the values that regulate the living of [humans] together: which is necessary from the standpoint of both the general social welfare and the full development of human beings as individuals. (Dewey, 1939, p. 400)

Life, education, democracy, community and becoming fully human are the themes that run through these three quotations by John Dewey. These themes and the concepts they embody emerge from, and are examples of, Dewey’s fundamentally non-dualistic world view. This is a philosophy that contrasts sharply with the dualisms in the world view of modernism that dominates educational experience in America today. These five themes and concepts of life, education, democracy, community and becoming fully human form the supporting pillars for the reconstruction of educational experience advanced in this dissertation. Non-dualism is the cornerstone of the foundational world view upon which it is built.

The world view known as modernism will be explained in greater detail in Chapter Two, but the central point I find problematic and upon which I focus is dualism. The
dualisms inherent in modernism are frequently tied to the Cartesian split or mind-body problem, whereby Descartes expressed the idea that we have a mind and a body with no common characteristics in terms of which they can be understood to be intelligibly related -- one visible, the other invisible. The impact of Descartes’ questioning of the separation of mind and body is such that it has become one of the central issues in Western philosophy for the last three hundred years. Another aspect of the Cartesian legacy expands well beyond this philosophical debate. Descartes’ rational method of questioning, merging with Bacon’s empiricism has over the intervening centuries evolved into the scientific method. When one takes the philosophical dualisms associated with, and/or emerging from, the mind-body split and links them to a narrow use of the scientific method, what I refer to as either/or thinking emerges.

The crux of my argument is the necessity of both/and thinking. By both/and thinking I mean the use of all forms of thought, both analysis and synthesis, and narrative, and metaphor and logic and .... This is essential for adequate understanding rather than merely gaining facts about something. Ways of thinking will be discussed in detail in Chapters One, Two, and Three; however, some groundwork for those chapters will be helpful.

An example to point out distinctions between what I mean by either/or thinking and both/and thinking is how a table is perceived. Using either/or thinking, a table is viewed as only an object. It can be described. It is made of wood, with metal screws that secure the legs to the top. As an object it is important because it has one or more functions. If it is a dining table, then its primary function is its use for meals. It may also be beautiful, but this
too is a function of its existence as an object. It has no significance beyond what it is in itself.

Both/and thinking views the table both as an object in itself and as a member in a variety of relationships. The trees cut for wood, the rain and sun that helped the trees grow, the carpenter, the ore from which the screws were made, the ancestors of the carpenter are all related to the existence of the table. If any one is removed, the table would not exist. In other words, the table is understood to be both constituted as an object made of wood and screws that functions in certain ways and constituted by the interconnected, indirect relationships that also made its existence possible. In both/and thinking, indirect, subtle relations are necessary and important to consider. They may not be of central focus, but must never be excluded.

Thinking of a table as merely an object may not seem troublesome; however, the mode of thought it exemplifies is problematic. We need an understanding of relatedness, connections between and among things. Bowers and Flinders state this in terms of the need to think ecologically because an ecology is “a system of interdependent relations” (1990, p. 234). A biology teacher at a college preparatory school related a common phenomenon among his freshmen students. He said they frequently do not understand the main ingredient in a fast food chicken sandwich comes from a feathered bird raised on a farm! They do not make the connection between chicken as a bird and chicken in a sandwich. Those are simply two separate, discrete objects they have no reason to connect. Their concepts are atomistic rather than ecological.
Either/or thinking is illustrated in various ways in all the disciplines. That there are separate, discrete disciplines is one aspect of either/or thinking. Areas of study are separated into independent categories -- the discipline is either science or art, history or literature, English or math. The reader might respond at this point, "Well, isn't it?" A major recommendation of this dissertation is that we re-frame this question, and others framed in a similarly closed manner and replace them with open questions. Such questions would allow for the discovery of more useful and complete explanations and additional worthwhile ways of inquiry -- ways that lead to still more questions and deeper, broader exploration. However, returning to the question as asked -- no, of course, science isn't the same as art, but science isn't art-less either. Science, at its best, is artful. History is reduced to a list of isolated facts without literature, a story to help us interpret those facts, to bind them together.

What I demonstrate as problematic is the domination of either/or thinking, not that all opposites or dichotomies should be eliminated. In psychology the problematic aspect of either/or thinking manifests as the familiar nature vs. nurture question. This debate has two distinct sides whereby humans are understood to be controlled by either nature or nurture. Thus framed, the either/or argument has no room for the role of interaction between nature and nurture nor does it consider the context, in which these interactions play out, to be significant.

Either/or thinking is less prevalent in psychology today, the nature/nurture dichotomy is in disrepute, but either/or dualisms are still rampant in education as well as everyday life. One of the most commonly voiced calls for educational reform, frequently
seen in the media, is a plea to add more days to the school year or to give students more homework. This idea may at first seem unrelated but is based on the either/or concept that holds that more is necessarily better; more days, more homework, more ... will fix whatever problems exist. This idea functions as a logical premise by assuming all problems in life, including educational ones, are arithmetic problems -- more or less of something is the answer. This is problematic in two ways. First, the major premise can be stated: All school days are educational. In order for the argument to be sound, all premises must be true. However, there is no evidence that this is a true premise. What is this premise based upon? Where is the reflection on what constitutes school day experiences? Likewise homework could be substituted for school days, and the truth of that premise needs the same exploration.

The second problem is that the method is inappropriate. A syllogism is a form of logic that is a closed, self-contained system which Dewey points out is problematic because it "does not provide for the function of invention .... there is no means of getting knowledge that is not already recorded ... no provision for moving from the known to the unknown" (1984, p. 62). In other words, what is viewed as the problem and its solution are stated at the same time. This type of thinking cannot be used for problem solving. Problem solving requires a mode of thought that moves us from the known to the unknown. If an answer is already known then there is no problem. Dewey's method of inquiry is open, allowing for exploration into the uncertainties of a problem.

Either/or thinking, as stated earlier, can be connected to the scientific method whereby a topic under examination is necessarily separated out for examination. This
isolation is part of reductionist methodology. There are many aspects of life where focus on precision, narrowing of possibilities for very specific purposes is important. As such, it is a necessary, indispensable mode of thought. Modern technology would not exist without it. But reductionism as a methodology is only one aspect of the scientific method which employs other modes of thought as well. When used alone, as a dominating mode of thought, it becomes limiting.

Both/and thinking encompasses the need for either/or thought but rejects the possibility of its universal applicability. When used in isolation without reflection, either/or thinking can exemplify a dehumanizing extreme. This is not readily noticeable when referring to a table; however, when this same objectification is applied to people the implications are enormous. An individual suffering from the effects of a heart attack, can be reduced to “the coronary in room 610,” or to a student, viewed not as John Smith, a young boy who engages in particular inappropriate or troublesome behaviors, but as “a behavior problem.”

Either/or thinking focuses on things rather than relationships as fundamental. Things can be separated, categorized, and as Dewey says put into “pigeon-holes.” This is an extension of Aristotle’s classification system taken to an extreme, whereby the object, table, is seen only as a member of the class, table; similarity, a person can be viewed as an object, only a member of a class -- a black, a white, a female. Both/and thinking sees relationships as fundamental. This means that relationships can never be ignored or eliminated -- nor are objects, diseases or conditions ignored. Rather they are understood as existing within the greater context of relations, not merely as separate isolatable entities. A hospitalized patient with malaria is an individual part of society who is suffering from a particular disease in the
context of a social institution, a hospital. All her needs, both directly and indirectly medical, as well as emotional, financial, etc. are part of the complex web of interrelatedness forming the person she is. Who did she come into contact with prior to hospitalization? Who pays the bill? Is the emotional depression she is currently experiencing connected to the malaria? Is it a prior condition? Is it related to treatment by hospital staff, financial difficulties, lack of visitors? Is it one, all, none, several, and/or factors not noted?

Both/and thinking means that focus is placed on the general aspects sometimes and specific aspects at other times, but both necessarily exist simultaneously and are not reducible one to the other. I am not either a doctoral student or a wife, a mother or a counselor. I am all of those and more, simultaneously. Yet, in particular instances, such as writing this dissertation, I am acting primarily as a student-scholar. Focus is on the particular activities that relate to this aspect of my life. Without intense, particular focus, I could not complete this work. However, I do not cease to be wife, mother, and counselor. Because these are relationships that help constitute my entire being, to exclude them would be to alter significantly who I am. I would be only, "a doctoral student," a member of a generalized category. But, as such a vacant entity, I could not be effective enough in my role as a doctoral student to complete the dissertation in a meaningful way. I might complete the dissertation, but it would lack the rich humanness of life.

An educational example of the difficulty arising from focus on the general category to the exclusion of the richness of relations inherent in the particular, occurred recently at a school with students from Pre-Kindergarten through twelfth grade. The school is subdivided into three divisions. The Lower School is Pre-K through fifth grade, Middle
School is sixth, seventh, and eighth, and the Upper School is grades nine through twelve. The student body can be classified as a general, whole, with the individual students as (only) members of that whole. The new Head of the upper division wanted to promote a sense of unity within the entire student body. He thought that events attended by all students together would serve that purpose. Since the school has a religious affiliation, he wanted to add an all-school chapel service before Christmas. (This could equally apply to any type of school assembly or event promoting unity in any school.)

Two problems arose: how to fit another event into the already filled schedule of the three divisions, and how to design a single event that is meaningful to four year olds, twelve year olds, graduating seniors. These problems can be overcome, but not without significant awareness of the richness of relationships inherent both in these sub-categories and inherent in the individuals themselves. But the new Head, focusing exclusively on the general category -- an all-school event for the purpose of unity -- could not understand those problems. He simply wanted to pick a time, and have an event. This is either/or thinking -- his focus was exclusively on time and event as either/or. He did not recognize that unity is a quality of relationships -- among students, faculty, school divisions, traditions, etc. An all-school event bringing all the students to the same place at the same time is not necessarily unity. In order to form unity, the event must be a meaningful shared experience. For the event to have meaning, the multiple needs must be considered. Unity is an emergent quality of shared meaningful experiences. However, the dualistic thinking of the new Head missed this necessity all together.
Dewey’s objections to dualisms and his espousal of an interactive unity do not go as far as the concept of fractals -- with their recursive self-similarity -- which I present in Chapter Four. However, such a both/and position presages one of the major distinctions between the isolating characteristics connected with modern Newtonian science and Euclidian geometry, on one side, and the recognition of interrelatedness characteristic of postmodern science and fractal geometry, on the other. Dewey’s objections and espousals run deep; they run through his concepts of life, education, experience, and democracy. A look at the three quotations which begin this chapter will add some scaffolding to the foundational ideas already presented.¹

“Life is a self-renewing process” (1916/1966, p. 2). This is a strong statement with metaphysical ramifications, not merely a factual account. This declaration brings with it an entire view about life. It is a positive, life-affirming statement; one which declares that life is dynamic and meaningful, filled with possibilities. Life does something; life is good. The idea that life is, as Victor Frankl puts it, “unconditionally meaningful”(1978), is central to my view of the universe and my relationship to it.

Dewey interprets life, that is human life, in an inclusive sense, stating that education is the means by which the process of social continuity happens. I further understand education -- the educational process, not the institution -- to be the process by which we learn to live life. In other words, life is an educative process in which every aspect is

¹ In order to avoid repeating the quotations in their entirety as I explore the densely packed ideas they contain, I ask the reader to return to the quotes as often as necessary to keep the connections and explanations coherent. I will repeat partial quotes assuming the reader will recognize the context.
educative in some way; educative (or miseducative) in that all experience in some way influences, shapes, guides, directs, us toward further experience. The heart of the distinction between educative and miseducative that Dewey makes is based upon the consequences. All experience is educative in that it engenders some sort of change. However, educative experiences are those that expand future possibilities, whereas miseducative experiences narrow and constrict potentials.

In the second quotation, Dewey says that “To learn to be human is to develop through the give-and-take of communication an effective sense of being an individually distinct member of a community” (1939, p. 389). This statement is densely packed. Dewey is saying that becoming human is not a nature or nurture issue. We learn to become human; humanness is not a given. We are biologically constituted for that possibility, but we need the context of human relationships to become effectually or fully human. For example, as humans, we are born with vocal cords capable of human speech, but it is only as distinct members of a human community that we learn human language.

In Democracy and Education Dewey explains the give-and-take process of communication as one “of sharing experience until it becomes a common possession” (1916/1966, p.9); that is, we share a common knowledge or understanding of something. Communication is thus part and parcel of the educative process, whether formal or informal. But Dewey recognizes dangers inherent in the communicative process. He says that, “As formal teaching and training grow in extent, there is the danger of creating an undesirable split between the experience gained in more direct associations and what is acquired in school. This danger was never greater than at the present time, on account of the rapid
growth in the last few centuries of knowledge and technical modes of skill” (p. 9). While technological change was multiplying when he wrote those words in 1915, he could not have foreseen that today it would be changing at an exponential rate. His warning, valid in his day, is vastly more applicable and urgent today. Educational experiences in schools continue to separate students from real life experiences. The experiences within schools are separated into isolated disciplines that seem to have no connections with each other. How many high school students have asked me what Algebra has to do with real life or why would anyone talk about math in religion class, science in English class, or literature in physics? Bits of information in each class are isolated as well. They are often strung together like dates on a time-line chart where the only real connection the students make is that by knowing a numbering system, they can place the isolated facts in chronological order.

Modes of thought are means of communication. The thread that connects them all is metaphor. Metaphor, by which I mean far more than a figure of speech, is perhaps the heart of both/and thinking. It is not only an object, a part of speech, but also a web of relationships, a way of thinking, a means of making connections. Metaphor is a central aspect of “sharing an experience until it becomes a common possession.” I explore modes of thought in Chapters Two, Three and Four; metaphor is the focus of Chapter Three.

Dewey tells us that we learn to be human through educative communication, and without such, we do not develop our full humanity. He wants us to develop “an effective sense of being an individually distinctive member of a community” (1939, p. 389). This ties directly into what democracy is about. As Dewey says, democracy is not only a form of government but a way of life, a means of social relationships. It is the epitome of a social
relationship which honors both/and thinking because of its inherent interdependence. Its interdependence is that the greatest possible development of the society depends upon its promotion of the full potential of all its members, who in turn are responsible for developing the society to its fullest potential. Either/or thinking undergirds rugged individualism and communism. In each case, social relations are based on a focus that honors either the individual or the society without significant regard for the other. Dewey says that democracy is needed if we are all and each to have the best possible life.

Dewey begins Education and Experience by saying that humankind “likes to think in terms of extreme opposites. It is given to formulating its beliefs in terms of Either-Ors” (1938/1963, p.17). A both/and position avoids these extremes and embraces the paradoxical tensions inherent in and biologically necessary for life. By ‘paradox’ I mean, not a logical contradiction to be resolved but the simultaneous holding of opposites -- the meaning of paradox whereby something can be simultaneously understood in more than one sense. Using this definition of paradox, rather than that of contradiction, life in its infinite complexity can be understood as inherently paradoxical. For instance, it is said that, “Birth is the beginning of death” but, it is also said that, “Birth is the beginning of infinite possibility.” Is life finite or infinite? Either/or thinking encourages us to privilege logic and single definitions of words, prodding us to choose one of these statements over the other. But these statements issue from different dimensions or aspects of life; it is their ‘bothness’ which gives full meaning to life. To be understood, they must be held in tension. Life is lived at the boundary or intersection of the two. Focus on the first alone leads to despair. Focus on the second alone is folly.
A stronger sense of this paradoxical tension emerges in the new sciences where the complexity of the universe is being understood at new levels -- "light is both particle and wave." Newtonian physics insists it is one or the other. The idea that "I am both free and determined" is a paradoxical statement in the sense that I am using paradox. As stated above, one attempt to resolve the oppositional tension in this statement manifested in the nature vs. nurture debate. Both/and thinking embraces the complexity of metaphor and enables us to explore and examine multiple relations and interrelationships without the necessity of reducing the whole to a single point. Metaphors cannot be reduced to a solitary definition. Logic helps clarify by pointing to the necessity of examining precisely what is meant when there is more than one definition. As Aristotle put it "one cannot affirm both 'p' and 'not p' at the same time and in the same sense." The statements "life is infinite and life is finite" cannot both be affirmed in the same sense. Both/and thinking encourages us to take the statement metaphorically where we can examine the possibilities of understanding it in multiple ways. Either/or thinking encourages us to simply reduce it to one or the other.

In an effort to develop my thoughts about the problematic of either/or thinking and its reductionistic tendencies, I will construct a metaphor -- Life as a tapestry. This metaphor will serve both as a means to explain further the philosophical position out of which I write and as a practical application of the importance of metaphor which I address in Chapter Four. In particular, I will examine the relationship between either/or thinking and discontinuities in the tapestry.

The tapestry I wish to examine is that of what is commonly call Western Civilization. I do not presume to weave that tapestry, just to assert that such a tapestry portrays the story
of the history of the Occident. All I wish to do here is trace a few threads, woven over the
centuries that connect the development of thought and philosophy with current modes of
thinking. Western civilization is often erroneously referred to as the continuation of the
Judeo-Christian tradition. I say erroneously because Greek is Occidental and Hebrew is
Oriental. This point is significant because of the fundamental differences in the primary
modes of thought out of which Greek and Hebrew cultures developed.

The Judaic roots of Christianity are Eastern; however, Greek thought has had a
tremendous impact on Christianity, especially during the second millennium of it history.
Consistent with the narrative mode of the oral tradition of the ancient Hebrews, is an
understanding of the paradoxical tension of existence. Narrative and paradoxical tension are
aspects of both/and thinking. The idea that birth could be described as both “the beginning
of death” and “the beginning of infinite possibility” is readily understood in Eastern thought.
However, the narrative and paradoxical thread of Oriental origin, has been hidden from view
through much of Occidental history.

TAPESTRY

Before constructing the metaphoric tapestry, let us look specifically at what a
tapestry is in order to add efficacy to the metaphor. Every society has developed weaving
quite early in its evolution. Tapestry is a particular type of weaving and is quite ancient,
possibly dating back some five thousand years (Ackerman, 1933). Simple cloth is most often
woven on a loom with the lengthwise, vertical threads, called the warp, attached to a beam
at the top and one or two beams at the bottom. These vertical warp threads form the
foundation. The horizontal, weft (sometimes called woof) threads are then woven in and out
between each warp thread. The warp threads run the length of the cloth from top to bottom, and the weft threads run the width, from one side to the other. At its most basic, simple cloth can be woven from a single color and without pattern. Tapestry can be regarded as a more complex form of simple weaving with increased potential for complexity of pattern. At its most complex, tapestry becomes a mirror of civilization (Ackerman, 1933); a pictorial narrative.

The weaving of tapestry is unique to cloth-making in two important ways. The warp threads, all the same color, are placed on the loom as in simple cloth making and so are still foundational. However, there is a difference in how the various colors of weft threads are woven in. First, the wefts are compacted to completely cover the warp. The warp and weft are not seen alternately, as they are on simple cloth. Rather, the warp in a tapestry is virtually invisible. The foundational and invisible aspects of the warp will have important metaphoric implications, especially in Chapter Four.

The second difference is that instead of moving the weft threads all the way across the loom, each color is drawn back and forth only as far as that color is needed to form the pattern. Therefore, unless some single color forms the ground all the way across the work, which would be rare indeed, there are no weft threads that are carried completely across all the warps. This forms what Ackerman calls “a technical eccentricity peculiar to tapestry” (1933, p. 303), resulting in horizontal discontinuity. The discontinuity of all the weft threads creates a structural problem. Structural integrity depends upon a close, tight weave and the fact that each weft thread needs to be interwoven with the next warp thread. However, the discontinuity, whereby the weft color turns back on itself, not crossing the next warp, and
the next weft comes from the opposite direction, stops and turns back on itself, creates a slit. For instance, if blue weft threads coming across the warp from left to right as part of a pattern forming water reach the shore, the blue threads turn back toward the left and go as far as the blue is needed. Perhaps there is tan shore on each side. The tan weft threads forming each shore will be drawn across, in and out of the warp until they reach the blue, then turn back and return the way they came. So on each side of the blue water, there will be a slit that forms the boundary between blue and tan, water and shore. This happens with each change of color. This is the tapestry discontinuity. No weft thread goes all the way across. There are always breaks, gaps, bifurcations.

What becomes significant for the purpose to which I want to put this metaphor is how the discontinuity is handled. If the slit is very small, it can remain, and even enhance the pictorial affect. Or it can be sewn from the back with a needle. However, over time the makeshift nature of sewing becomes evident because it will not bear up, the added threads eventually break. Ackerman says “the only real solution must develop in the weaving itself .... The most complicated but most complete solution is the interlocked weave, in which the two different colored wefts are looped through each other at the point of contact” (1933, p. 304). This method removes the slit, making the fabric equally sound throughout and the intersection, which remains becomes invisible.

One final characteristic of a tapestry is that it is woven from the back -- indirectly so to speak. The weaver must get up from the seat at the loom and go around to the other side to view what has been woven. This is much like everyday life where we must be removed from the immediate experience to look back to or reflect on that experience. One
error often made is forgetting that a part of reality cannot be understood in isolation, but only as a part of the whole, a whole in which parts are and are not separated. This sense of continuity integrated with individuality lies at the heart of Dewey’s concept of experience (1916/1966, 1929/1958, and 1938/1963).

LIFE AS TAPESTRY

Life as tapestry can be applied to the multifaceted aspects of life. Ackerman (1933) uses the phrase, mirror of civilization as a metaphor to describe the way numerous cultures have depicted their histories via that form of pictorial narrative. In America today, movies serve a similar societal function, becoming modern tapestries or pictorial narratives, that tell stories of individual lives as well as those of the society and its history. Miles Richardson says that “In addition to being both biological creatures and economic beings ... we are in the same fundamental manner, storytellers” (1991, p. 207). As humans, we have a need to tell our stories; it is through the stories we tell that meanings emerge and the richness of life is experienced. Life has beginnings and endings and is interconnected with other parts of the social, cultural, cosmic tapestry. Meaning is made as we look at the relation between our own life story and those of other individuals and societies, now and in the past.

Discontinuities can destroy meaning. Without meaning, we become a society of individuals with fragmented experiences, distressed by a sense of separation and isolation, inhabiting a world made of disparate parts. Dewey says that taken far enough, the division within the person will produce insanity -- a tapestry of holes and disconnected threads. “A fully integrated personality, on the other hand, exists only when successive experiences are integrated with one another” (1938/1963, p. 44) like the interweaving of warp and weft.
Two subtle but important aspects of the tapestry metaphor relate to what in life is readily seen and what is not so readily seen.\(^2\) The horizontal weft threads may be understood as the ‘visible’ aspects of life, the picture constituted by the actions, events, places, people we ‘see’ in everyday life, in the classroom. The warp threads can represent the mental ‘invisible’ relationship aspects of life that bind life experiences together but do not have the same tangible or visible form. The domination of either/or thinking, with its strong connections to empiricism which privileges concrete physical experience, tempts us to focus exclusively on the visible aspects of life, discrediting or dismissing the invisible relational aspects. However, the warp threads alone are useless and the weft threads alone have nothing into which they can be woven. Likewise life as a worthwhile and meaningful endeavor is generated out of the interweaving of its visible and invisible aspects.

In order to interweave life tapestries with continuities rather than ignoring or disregarding discontinuities, we return to Dewey. He says, in one of the quotations that begin this chapter, that education is the means of social continuity of life. If schooling is part of education, then story telling, the narrative, the metaphorical all have important roles to play in schooling and education. Richard Hopkins says, “Our narratives are the means through which we imagine ourselves into the persons we become…. [Without narrative opportunities] the materials of schooling are prevented from delivering narrative meanings; thus they often are not learned; they pass out of consciousness as waste material, undigested and unintegrated” (1994, p. xvii). We need metaphors because “metaphors are a way of

\(^2\) In this instance I use the terms seen or visible to denote both a level of awareness and that which we know or understand readily through any of the senses not just sight.
talking about experience” (Gordon, 1978, p. 9). And as Vaught says allow us to find “an intersection of indeterminacy and determination” (1987, p. 228). Chapters Two, Three, and Four will explore these threads in our tapestries as modes of thought. Chapter Five will magnify some of the hidden threads in Dewey’s views of experience and Chapter Six will weave theory into practice, while Chapter Seven will recursively reflect some of my own teaching stories.
CHAPTER TWO

TWO MODES OF THOUGHT

[HU]MANKIND likes to think in terms of extreme opposites. It is given to formulating its beliefs in terms of Either-Ors.

(Dewey, 1938/1963, p. 17)

In *Actual Minds, Possible Worlds*, Jerome Bruner states, “There are two modes of cognitive functioning, two modes of thought, each providing distinctive ways of ordering experience, constructing reality” (1986, p. 11), the logico-scientific mode and the narrative mode. The two modes are distinct, complementary, and irreducible. Yet both are needed in order to “capture the rich diversity of thought” (p. 11).

Limiting thought to two modes is somewhat problematic. It suggests the dualism of Descartes’ mind/body split -- dividing a person into physical and spiritual. However, as Capra points out, “Throughout history, it has been recognized that the human mind is capable of two kinds of knowledge, or two modes of consciousness, which have been termed the rational and the intuitive, and have traditionally been associated with science and religion” (Capra, 1991, p. 26-27). In a very broad, generalizable sense, these two modes encompass the range of possible thought. The paradigmatic or scientific is precise, logically dealing with fact. The narrative or intuitive, principally through story, has ample breadth to encompass the remaining modes of thought.

These two modes serve as a vehicle for discussing various consequences of the ways in which the West has both divided and fragmented itself. C.P. Snow experiences this split as a separation into two cultures (Snow, 1969). Science was moving “from being considered
a central part of mainstream culture to an isolated specialty” (Schwartz, 1992, p. 186). During the 19th century, science was still accessible to those with lay interest, not just the scholar. For example, in Leeds there were six societies for amateurs interested in microscopy alone (p. xvii). But by the mid-twentieth century, the segregation of science had become part of the social, cultural fabric of the West. “Science has become the new voice of authority,” (p. 1) an authority that is as little understood or challenged as the ecclesial authorities of the Inquisition. Somehow the “clarity of physics came to be expressed in ... inaccessible mathematical language” (p. 1).

When Bruner speaks of two modes, he is suggesting that neither mode is superior nor sufficient. However, as Dewey (1929) maintains, we (Western civilization for the last three hundred years) have tended to use one extreme, one mode — the scientific, rational, logical which Bruner identifies as paradigmatic. When Kuhn introduced the term paradigm into current usage, one which Bruner draws upon, he related it closely to “‘normal science’ [which] is predicated on the assumption that the scientific community knows what the world is like” (1970, p. 5). As Bruner says, “the paradigmatic mode of thinking deals in general causes, and in their establishment, and makes use of procedures to assure verifiable reference and to test for empirical truth” (1986, p. 13).

**HOW PREVALENT IS OUR USE OF THIS MODE OF THOUGHT?**

Doll contends it has been the foundation of “American intellectual, social, and educational thought during the first seven or eight decades of this century” (1993, p. 1). For Donald Schon, who calls it ‘technical rationality,’ it is the dominant epistemology of professional practice (1983, p. 21). And it is the continuation and development of eighteenth
century thought which was marked by “the spread to all fields of human interest of the method and aims of Newtonian science” (Randall, 1940/1976, p. 389).

This ‘scientific’ paradigm is really scientism -- scientific thinking taken to the level of a controlling metaphysics. As Frankl puts it, “when a scientist who is an expert in the field of biology attempts to understand the phenomena of human existence in exclusively biological terms, he has fallen prey to biologism” (1970, p. 397). And when biology becomes biologism, science becomes ideology (p. 397).

This paradigmatic mode operates on the principles of Newtonian science and Cartesian methodology and uses those fundamental assumptions (Barbour, 1990). These were and are “assumptions about nature consistent with the certainty of physical laws and the symbolic power of machines.... Mechanism substituted a picture of the natural world, which seemed to make it more rational, predictable, and thereby manipulable” (Merchant, 1980, p. 227). In summary, these assumptions, which are in turn based on the further assumption that matter is the basic component of reality, are:

1. All matter is composed of component parts - **Atomism**
2. The universe is governed by discoverable laws - **Deterministic Order**
3. Knowledge (as well as wealth) can be abstracted directly from nature - **Context-Independence**
4. All problems can be broken down into constituent parts and manipulated variable by variable - **Reductionist Methodology**
5. Sensory information comes in discrete units; it is not interconnected - **Mechanistic**
Using this paradigm, what is true of machines is true of nature and vice versa. Machines can be controlled and manipulated; their actions are predictable. Machines, says Merchant, are the “structural models for Western ontology and epistemology” (1980, p. 227). The deterministic aspects of this paradigm are so dominant that we now see ourselves as merely complex machines, whose thoughts and behaviors can be controlled and predicted (Minsky, 1986).

The continuing focus on the ‘human machine’ in science is readily found in the field of artificial intelligence (AI). Although there have been “diverse viewpoints that have characterized the leading practitioners and commentators during the first three decades of AI” (Gardner, 1985, p. 141) one dominant perspective explicitly equates humans with machines—“strong AI” (Searle, 1980). “According to strong AI, the computer is not merely a tool in the study of the mind; rather, the appropriately programmed computer is a mind” (p. 353). Indeed Marvin Minsky, cofounder of the Artificial Intelligence Laboratory at MIT, (which has received research support from Thinking Machines Corporation), regards the status debate over humans as machines, as simply the inadequacy of our concept of machines. He says we think of them too narrowly. Early machines lacked complexity; they were “simple devices like pulleys, levers, locomotives and typewriters” (Minsky, 1986, p. 30). Human brains consist of billions of cells, whereas present-day computers have only millions of parts. These, he calls intermediate in complexity. However, in the building stage are billion-part computers. With this added complexity, we should be able to upgrade our concept of machines and, “Then we'll find more self-respect in knowing what wonderful
machines we are” (p. 30). “Minds are simply what brains do” (p. 287) and those minds are only computers.

Essential to mechanistic functioning is the concept of cause and effect. Jacob Bronowski maintains that it has so dominated our thinking that, it has “been elevated to the rank of the central concept of science” (1978, p. 40) and “has become our natural way of looking at all problems” (p. 59). This obsession with mechanistic causality is clearly an extension of Enlightenment thought (Doll, 1993). By the eighteenth century, the ideas of Galileo, Descartes, and Newton permeated the thinking of the educated. “Thinkers believed that the scene of human life was set in a great, fixed geometrical and mechanical order of nature, a mighty machine eternally pursuing the same unchanging round of cyclical processes” (Randall, 1940/1976, p. 274). But it also maintained characteristics of Aristotle's cosmology -- eternal and static. And “this belief in an unchanging cosmos held a firm grip on Western thinking well into the twentieth century” (Lightman, 1991, p. 9). A clockwork order set into motion by a watchmaker God became the mechanistic cosmology of the West.

The changes this represents from an earlier time are much deeper than they might seem. Science from Plato to Galileo was an attempt to discover the use and purpose inherent in Nature, in things. Nature was harmonious and everything existed according to its own particular nature. But the new scientific methods of Galileo, Bacon, Descartes, and Newton slowly changed both how and what was perceived as Nature. Qualities previously attributed to a substance -- such as wetness or coolness of water -- were no longer explainable in qualitative terms. Water was composed of particles, a quantitative concept,
and wetness was no longer a property; it resided in the mind that perceived the water (Randall, 1940/1976, p.268). Or as Dewey puts it,

Science, it is said, has stripped the world of the qualities which made it beautiful and congenial ... and presented nature to us as a scene of indifferent physical particles acting according to mathematical and mechanical laws. (1929, p. 41)

Knowledge, like mind “became a separate, isolated quantity, removed from the experiences and wisdom of life” (Doll, 1993, p. 113). The “method of the ancients in basing their conclusions about knowledge on the nature of the universe in which knowledge occurs” (Dewey, 1929, p. 41) was being reversed. The new method was to “arrive at theories regarding the nature of the universe by means of theories regarding the nature of knowledge” (p. 41). Along with a new metaphysics a new epistemology was being born; a verifiable epistemology. With the separation of knowledge from life experience, a gap between experience and nature began to open -- a discontinuity in our tapestry. Today this gap has become a chasm so wide that the equation between humans and machines is seldom questioned.

In the sixteenth century, Francis Bacon sowed seeds that would bear fruit in future centuries. “Bacon's scientist not only looked but behaved like a priest who had the power of absolving all human misery though science .... He was clothed in all the majesty of a priest ... [and] worship [was] to be accorded to the scientist” (Merchant, 1980, p. 181). The most divine power in human achievement was Science (Randall, 1940/1976, p. 279). And this divine power was to be manifested in the control of Nature. No longer was teleology important, science could provide the power to determine the ends to which things were put.
The next, quite logical step was to interpret the role of the one who controls nature as the one who creates nature. This can be expressed in several ways. For Harrington it is scientist as God. He calls for a new faith, a faith founded on technological abilities "and nothing else; that man's fate depends first on the proper management of his technical proficiency.... our only messiahs will be wearing white coats, not in asylums but in chemical and biological laboratories" (1969, p. 234, emphasis added). The physicist Joseph Schwartz believes Harrington's call has been answered. He says that science "has today become magical and religious. Particle accelerators are cathedrals, men in white coats are priests, the scientific literature is the gospel, and television is the pulpit where scientists promise miracles in one breath and doom in the next" (1992, p. 187). The architectural design for the administrative building of the Fermi Lab, with its gigantic particle accelerator, was deliberately patterned to imply a Gothic cathedral. Victor Frankl finds this position truly remarkable. He says that "man, as long as he regarded himself as a creature, interpreted his existence in the image of God, his creator; but as soon as he started considering himself as a creator, began to interpret his existence merely in the image of his own creation, the machine" (1988, p. 16).

The dominant movement of thought through the nineteenth century into the twentieth placed greater and greater emphasis upon the logico-scientific mode and less and less upon the narrative, intuitive, metaphoric mode which became almost exclusively connected with art, literature, and theology. Snow's two cultures were clearly forming. Two books written in the 1920s serve as an insightful example of the dichotomy in thinking, the either-or, as well as the emphasis upon the preeminence of scientific thought. Eugenio
Rignano published *Man Not a Machine: A Study of the Finalistic Aspects of Life* (1926) and two years later Joseph Needham's reply was published in the form of *Man a Machine, in Answer to a Romantical and Unscientific Treatise Written by Sig. Eugenio Rignano & Entitled “Man Not a Machine”* (1928).

Needham not only scoffed at Rignano's idea about the nature of humankind, he also denigrated his *mode* of thought -- it was 'unscientific.' Science and scientific thinking continues to be viewed as the greatest manifestation of 'modernization.' It is the fuel that powers the engine of modernism, the modern world view. As Mendelson puts it today, "Not only are its productions and its explanations or concepts applauded, but its approach, the 'scientific' way or world view, is celebrated as marking a distinctly and higher form of human activity" (1993, p. 23). Scientific technology "has become the dominating factor of modern civilization" (Brunner, 1949, p.2). Arthur Clarke puts it rather succinctly in *Profiles of the Future: An Inquiry into the Limits of the Possible*: "To put it bluntly and brutally, the machine is going to take over" (1963, p. 213). Not only does he portray humankind as machine-like, but he predicts machines surpassing human intelligence before the conclusion of the twenty-first century -- a position consistent with Minsky and strong AI.

**IS HERBERT SPENCER RIGHT?**

To the question ....What Knowledge is of most worth?--the uniform reply is--Science. This is the verdict on all counts .... For direct self-preservation .... gaining a livelihood .... parental functions .... good citizen-ship .... the enjoyment of art .... purposes of discipline .... Science ... is the best preparation for all of these orders of activity. (Spencer, 1859/1929, pp. 84-85)
Spencer quite literally asserts that science is the answer to everything. Is Minsky right -- are we thinking machines? Is the logico-scientific paradigm the only significant or requisite pattern of thought?

As Dewey says, we are given to thinking and framing our ideas, our questions in either-ors. The two questions above, thus framed, require an answer of yes or no -- True or False. These are closed, objective questions. The answer is implied within the question (just as on standardized tests). There are no other possible answers, no other choices. That there is an answer is certain. Such is the scientific method. Hypotheses are either validated or falsified.

Have we benefitted from this mode of thought? YES, we have walked on the moon through scientific achievement. Medical science has prolonged life, wiped out epidemics and alleviated massive human suffering. Electronic communications have established a global village. The successes are beyond number. NO, we have suffered dearly from the failures. Lives were lost in the tragic explosions of the Challenger space shuttle and the Chernobyl nuclear power plant. On May 27, 1993, NBC Nightly News reported a number of patients testing positive for HIV had been treated at several hospitals around the country by physicians claiming to have a cure for their disease. The treatments are reportedly neither legal nor cures. The patients however, said they allowed the treatment procedures because of an unquestioning trust in scientific medical expertise. This epitomizes what Lieberman calls the tyranny of the experts (1970). And Bohme says that “the ‘scientification’ of the lifeworld is connected with the loss of people’s ability to help themselves; they become dependent on experts” (1992, p. 51). The tyranny of dependence upon experts brings with
it a loss of connection on several levels. One loss is on the meaning dimension of the life tapestry, where our stories are connected to identity and purpose. Therefore, a simple yes or no answer to the question of whether we have benefitted from science is inadequate.

It is not the mode of thought itself that is problematic. Rather, it is the domination, the impact and the consequences of that domination which manifest themselves in all aspects of human life, that need examining. To say that science either is or is not the answer is tacitly to accept Spencer's concept of science. By science, Spencer meant Descartes and Newton's science, out of which the scientific method as used today, evolved. A closer investigation of this method and the way of thinking that accompanies it can give us a deeper understanding of the consequences and persistence of this mode of thought. It can also lead us to a more comprehensive view of science. The so called 'new sciences' of complexity and quantum physics certainly use, but are not limited to, the logico-scientific mode of thought.

For a closer inquiry into the logico-scientific mode, I will begin with the five terms outlined earlier in the summary of assumptions that underlie the principles of Newtonian science: atomism, deterministic order, context-independence, reductionistic methodology, and mechanism. Atomism assumes all matter is composed of component parts, therefore knowledge is discovered by studying the parts. The methodology for dealing with problems, all problems thus becomes methodological reductionism. This method breaks problems down into parts for manipulation. The mechanistic assumption views all systems as linear. Linear problems are simple and solved step by step; one need only find the right formula. Linear relations can be illustrated with a straight line on a graph. Such systems can be taken
apart, put back together, and all the pieces add up (Gleick, 1987, p. 23). These are closed, sequential systems, and work much as machines do. The last two assumptions are then used to complete the project. Context-independence means that all objects can be examined directly and will be found to be the same regardless of time or place. Deterministic order assumes knowledge gained through this procedure will be universally true because the world is subject to fixed laws.

The physicist Fritjof Capra sums up classical or Newtonian science nicely. Classical science views the universe as a vast machine which can be observed "objectively without ever mentioning the human observer, and such an objective description of nature became the ideal of all science" (Capra, 1991, p. 56). The world is a machine made of parts and the prevailing recipe for understanding things is to take them apart and study the components. If you don't understand them, take those apart ....

This set of premises and assumptions works well for many scientific endeavors and forms the foundation of the Scientific Method. However, it is no longer simply the method for 'doing science.' It has been expanded into the dominant metaphysical world view of Western civilization -- modernism, or modernity (Doll, 1993; Jenks, 1987; Habermas, 1983; Griffin, 1988). Arthur Peacocke, scientist and theologian, recognizes just how easy it is for scientists who "employ methodological reductionist concepts .... to transpose this methodological necessity into a more general philosophical attitude" (1985, p. 7). The analytic procedure critical for the work of physical biochemists and molecular biologists "becomes almost unconsciously a philosophical belief about biological organisms being 'nothing but' the bits into which they have analyzed them" (p. 7). He believes this "nothing
buttery” is without malice or reflection. It is “simply a very natural psychological transition from the methodological necessities of the way they work to an implicit philosophical position .... [of] unreflective and implicit reductionists” (p. 7).

This subtle, yet remarkably important shift from methodology to world view is at the crux of the issue -- the problematic of two modes of thought. This small deviation allows, indeed demands, only one mode of thought. If all thinking is to be funneled into a single conduit, then instead of embracing numerous ways of knowing, understanding, interpreting, all thought is to be viewed and understood via a single model, the paradigmatic mode. There is no outlet for, no emergence of Bruner's “rich diversity of thought.” Classical science as represented by only one mode of thought, is woefully inadequate as a world view.

*Weltanschauung* is the German term for world view or outlook. *Weltanschauung* is a generalized view of the universe and a person's relationship to it. It is usually applied to a philosophy affecting practical attitudes and beliefs rather than the purely theoretical (Flew, 1979, p. 372). The practical always derives from theoretical constructs. Our world views embody our fundamental attitudes that we base our scientific, theological, literary, educational undertakings on the world view we hold. Our philosophical position provides the framework by which we interpret the world and thereby establish the very ground from which our thoughts and actions emerge. These are the assumptions about how we think life is or ought to be. Not only are these the underpinnings for our individual ideas and theories about the world, but they also constitute the views held by social institutions, societies and civilizations. This is the case regardless of our level of awareness of our world view. Implicit
world views shape and direct individuals and civilizations with no less power than explicit ones.

The shift that Peacocke observed in individual scientists from a methodology to a world view, can also be noted at the “megaparadigm” level (Kung, 1988). Modernism, as the dominant world view of Western thought today, is a megaparadigm. This megaparadigm shift is from the premodern world view to the modern and is inextricably bound up with ideas about science. As noted above, the premodern world view was heavily influenced by the science of Aristotle. Premodern science studied virtually everything, not merely the physical world. Nature was viewed as harmonious and purposeful. Qualities rather than quantities reflected the focus for inquiry. Knowledge was generalizable and interrelated.

CONSEQUENCES OF THIS SHIFT

As we have seen, qualities are not part of modern science. “Throughout history each culture’s cosmology has reflected its view of the world [and] in the West, cosmological speculations gradually shifted from gods and myths to physical mechanisms” (Lightman, 1991, p. 3 and 7). This shift in thinking is a replacement of the narrative exclusively with the logico-scientific mode. The “Newtonian vision is a vision of the world as mechanism. This vision still dominates Western scientific thought. [And] gone in the Newtonian framework is human history and the autonomy of human action” (Schwartz, 1992, p. 25). What threads are missing from our life tapestry?

One mode of thought upon which to build a world view of megaparadigmatic proportions is just too limiting. In describing the field of economics since the 1950s, McColskey states that “economics has believed itself narrowed down to fact and logic”
becoming a full participant in “the temporary narrowing of Western culture called ‘positivism’ or ‘modernism’” (1990, p. 5). Fact and logic are of course, the epitome of Bruner’s logico-scientific mode of thought. McCloskey says, however, that economics, as well as other arts and sciences, uses “the whole rhetorical tetrad: fact, logic, metaphor and story. The allegedly scientific half of the tetrad, fact and logic, falls short of an adequate economic [or any other sort of] science .... The allegedly humanistic half falls short of an adequate art of economics, or even a criticism of form and color” (1990, p. 1). McCloskey contends that science is not just fact and logic. “Newton used logic and metaphors; Darwin used facts and stories” (1990, p. 8).

At this point the reader may assume a shift from the scholarly to the romantic. The mention of rhetoric may stimulate images of the ‘merely’ literary. However, that would mean participation in the “fragmentation of our intellectual life” (Peacocke, 1971, p. 9) into C.P. Snow’s two cultures. He maintains that we have broken our intellectual perceptions into “two polar groups .... Literary intellectuals at one pole--at the other scientists .... Between the two a gulf of mutual incomprehension” (Snow, 1969, p. 2-3). Since, as we have already seen, science “is celebrated as marking a distinctly and higher form of human activity” (Mendelson, 1993, p. 23) it would be easy to make Snow’s poles hierarchial with science intellectually superior to literature. Yet McCloskey claims that science does and must use the whole rhetorical tetrad. Facts and reason taken to their logical extreme might otherwise assure us that Hitler reasoned rightly when destroying ‘defective’ and ‘unproductive’ people.
The absurdity of such a hierarchy and the need to use all that is available to express ourselves can be seen in examining the term, literature. Having dichotomized academic and intellectual disciplines into Snow's two cultures, we tend to assume that science actually exists separately from literature and vice versa. We also tend to limit our concept of what constitutes literature to novels, plays and poetry. However, in order to do academic research, be it physics, engineering, or philosophy, a major portion includes a review of 'the literature.' The term used in this manner of course includes all pertinent information current to that discipline. McCloskey is right. A scan of just a few books or journals will illustrate that indeed academic literature is comprised of fact, logic, story, and metaphor. For example, a contemporary scientist teaching the concept of chaos says, "Junk your old equations and look for guidance in clouds' repeating patterns" (Cvitanovic, 1984, p. 4). Literature is not a matter of either fact or story. Literature is simply the writing out of all the ways humankind has communicated throughout history - including communication in the field of science.

Actually science isn't a listing of facts and logical conclusions anyway. Science "is a kind of language, and as such it exemplifies the dialogue between mind and nature" (Ferris, 1992, p. 8). Schwartz goes further in telling us that

Science is an accumulation of written narratives about our relationship to nature. It is no accident that this repository is called the scientific literature. The scientific literature consists of narratives, stories of how we have understood our experiences of the natural world. And like other narratives, they can be analyzed critically to uncover their unstated assumptions and hidden meanings. (1992, p. xvi-xvii)
To view literature as a context for the writing out of human thought, is not to say that all literature is of equal importance or intellectual value. It is to say that all elements of rhetoric are. “Each part of the rhetorical tetrad ... places limits on the excesses of the others. ... One part of the tetrad checks the other’s rank immoderation” (McCloskey, 1990, p. 4).

An oversimplification of Bruner’s two modes of thought can, as McCloskey suggests, equate fact and logic with the logico-scientific, on the one hand, and metaphor and story with the narrative, on the other.

This oversimplification is the reductionistic “nothing buttery” of modernism. It results in undue separation between the modes. Indeed, we quickly arrive at Kuhn's very modern notion of incommensurability. If the logico-scientific mode of thought, the paradigmatic, is connected with Newtonian science, the narrative, intuitive mode can be connected with Einstein's 'new' science. Bruner says that “Linguistically and in spirit as well, the modern novel may be as profound (and perhaps out of the same cradle) as the invention of modern physics” (1987, p. 21). These modes of thought, like the two sciences, are complementary and generative to, not incommensurable with, one another.

Particle physicist John Polkinghorne questions Kuhn's conclusions. “Kuhn dismisses as an irrelevancy the well-known fact that Newtonian mechanics is the slow-moving limit of Einstein's mechanics” (Polkinghorne, 1986, p. 15). Kuhn sees the views of Newton and Einstein as constituting competing paradigms rather than different points on a continuum. As such, proponents of each practice their trade in different and incommensurable worlds (Kuhn, 1970), the worlds of C.P. Snow's two cultures. Kuhn's conception of two separate
worlds, two distinct modes of thought, points to a dualistic pattern of thought into which philosophers and others tend to fall.

However, Polkinghome, Capra, Bruner and Peacocke all deny the necessity or inevitability of two separate worlds. They each, in their own way call for an alternative world view; a world view that combines integration and fragmentation, one I will henceforth call postmodern. Peacocke says that people “will not be satisfied with a perspective of the world which indefinitely fragments their experience; they need a framework which will enable them to weld their individual and corporate lives and thought into an integrated whole” (1971, p. 8). This new synthesis will be dynamic not static. However, “such a vision of a new unity in diversity ... will always have a provisional character” (p. 8).

We need not, nor dare, reject any element of thought nor take an either/or position. Newton's mechanics still work at the everyday level of experience, but only at that level. As Capra says, “it is a good approximation to say that things consist of constituent parts” (1991, p. 81). Therefore we can say a grain of salt consists of salt molecules. Salt molecules consist of two kinds of atoms, and those atoms consist of nuclei and electrons. The nuclei are composed of protons and neutrons. However, at the particle level, there is a shift; it is no longer possible to understand things that way.

Heisenberg's indeterminacy principle states that if, at the subatomic, particle level, we can determine where an electron is, we cannot know what it is doing; if we know what it is doing, we cannot know where it is (Polkinghorne, 1986, p. 5). This seems illogical, unreasonable. To accept this principle is to recognize “the insights of depth psychology [which] have modified our understanding of the operation of human reason” (Polkinghorne,
It is to go beyond the senses, reason and logic and recognize that "our conscious minds are counterbalanced by an unconscious component, at once creative, chaotic and teeming with symbol" (p. 5). It is simply to recognize the limitations of rationality, objectivity, and determinism. Such acknowledgment need not "relinquish a belief in reason, a respect for reality or a search for order ... [Rather it can be] an acceptance that beside the insights of science, expressible in the quantitative language of mathematics, there are the equally necessary insights ..., expressible in the qualitative language of symbol" (Polkinghorne, 1986, p. 5).

The scientific method and the paradigmatic mode of thought have never accomplished anything interesting alone (Polkinghorne, 1986). Scientists rely on metaphor and story as well as fact and logic. It is in the social sciences, and in education in particular, where reification of the scientific method has been most commonly practiced. Education forms the foundation for all disciplines. By the time a student enters college, she has spent at least twelve years in an educational system dominated by the paradigmatic mode of thought. For most students today, educational experience is still constructed out of a modern world view.

In order to reconstruct educational experience, we need a postmodern world view that is a scion of premodern and modern ideas, views and thought. Just as quantum physics transcends classical, Newtonian physics without repudiating it, a Post-modern world view must contain seeds from premodernism and modernism. In its transformation from its progenitors, it will embrace the qualities that Polkinghorne says characterize a postmodern scientific view of the world (1986). These qualities depict the world as elusive, intelligible,
problematic, an interplay of chance and necessity, big, tightly-knit, complete, and incomplete. A truly adequate postmodern perspective will view the world and its reality in terms of these multivariate qualities, for our world is too large and complex ever to be completely understood. Indeed Polkinghorne realizes that science, like literature, is not the fountain of truth but belongs "in the arena of human discourse" (1986, p. 25), and thus, within the context of a story of agents and what they do. "At any particular moment verisimilitude is all that can be claimed as science's achievement - an adequate account of a circumscribed physical regime, a map good enough for some, but not for all purposes" (p. 23). This statement echoes Bruner's view of art and the humanities. "The aim ... is that the hypotheses fit different human perspectives and that they be recognizable as 'true to conceivable experience': that they have verisimilitude" (1986, p. 52). This will only be achieved if we successfully integrate the logico-scientific and narrative modes of thought -- making effective the interweaving of weft and warp to create a tapestry that is a continuous whole.
CHAPTER THREE

THE NARRATIVE MODE

Narrative imitates life, life imitates narrative.

(Brunner, 1987, p. 13)

What does Bruner mean? What is life, narrative? In his article, "Life as Narrative," Bruner says that life involves our memory and interpretation of "lived time" rather than chronological. And "we seem to have no other way of describing 'lived time' save in the form of a narrative" (1987, p. 12). But this is not merely a descriptive process, a trivial telling of a story; "it is always a cognitive achievement" (p. 13) -- an achievement that is a two-way proposition. Kerby, in his work Narrative and Self, expresses this interactive aspect of language usage by saying, today "language is viewed not simply as a tool for communication or mirroring back what we otherwise discover in our reality but is itself an important formative part of that reality" (1991, p. 2). (Further significance of this statement will emerge in an ensuing chapter with an examination of how dominant metaphors help shape our social, cultural and educational realities.)

A brief exploration into the historical use of the term narrative is needed at this point. According to the Oxford English Dictionary (hereafter OED) the word narrate came into regular English usage only after 1750. Prior to that time the term was principally translated from Latin or Spanish. Both the Latin stems narrae to relate, recount and gnarus knowing, skilled, and thus ultimately allied to know (OED, 1971, p. 1896) constituted the
early use of the verb narrate and the noun narrative. In other words, what could be known and related in words was narrative. The scope of narration was broad indeed. The recounting of history was narrative, telling a story was narrative, relating the positions of the planets was narrative, portions of poems were narrative. Indeed, "the most inclusive meaning of 'narrative' refers to any spoken or written presentation" (Polkinghorne, 1988, p. 13).

It is no coincidence that the application of the word narrative has narrowed dramatically over the years since 1750. As we saw in Chapter Two, the intervening years coincide with modernism. As was shown, one project of modernism was to define, determine and delineate completely. Everything was presumed knowable once reduced to its most basic form. The meaning and use of the word narrative shifted from a way of relating or telling anything that is knowable to a very particular form of language use. In everyday speech today, narrative is simply a story or tale and story is the synonym for narrative (Webster's New World Dictionary, 1988, p. 901). This corresponds to the change in the term literature. Stories are nice to read to children at bedtime, but of little epistemological significance in the modernist world view.

This truncated use of narrative is hardly what Bruner or Kerby mean. They each reach back to reclaim both relating and knowing as constituents of narrative. Bruner, however, focuses primarily on the telling of life stories in discussing the importance of the narrative mode of thought (1986, 1987). Using Kerby's arguments regarding the significance of narrative, we can go further. He says, "narratives are a primary embodiment of our understanding of the world, of experience, and ultimately ourselves" (1991, p. 3). Through
the use of narrative we can acquire a form of understanding that cannot be attained elsewhere. It is through narrative that we express our cosmology. Lightman says, “Although based in the methods of science, modern cosmology asks primeval questions and thus sits near the boundary between science, philosophy, and religion” (1991, p. 3). This boundary cannot exist solely in either the logico-scientific mode or the narrative mode -- it can exist only in the interplay of the two. The logico-scientific mode enables us to answer the ‘how and what’ questions of the universe. The narrative mode permits us to examine the ‘whys.’ We require both modes to get a dynamic, productive, and creative understanding of life as meaningful.

One major aspect of narrative is its relational quality. “Narratives articulate not just isolated acts but whole sequences of events or episodes, thereby placing particular events within a framing context or history” (Lightman, 1991, p. 3). Donald Polkinghorne makes an even stronger case when he says that “narrative is the fundamental scheme for linking individual human action and events into interrelated aspects of an understandable composite. Narrative displays the significance that events have for one another” (1988, p. 13).

This relational quality resembles the hermeneutic circle -- circle of understanding. In hermeneutics, understanding is gained in the relationship of parts and the whole: the whole is understood in relation to the parts that comprise it and the parts are understood in relation to the whole. Kerby says that it is through the unifying action of narrative that we gain meaning. “In other words, isolated events need to be placed within a developing network of further acts if their broader significance is to be grasped” (1991, p. 3-4). Gadamer, in discussing hermeneutics, makes an implicit connection with narrative in saying
that “the meaning to be understood is concretized and fully realized only in interpretation” (1989, p. 332). To “understand something is to grasp its meaning or significance. To interpret something is to apprehend what it signifies for a certain standpoint or situation” (Kneller, 1984, p. 67). Thus, understanding and meaning come through interpretation of things or events framed within a context. A life tapestry, a pictorial narrative is comprised of separate threads woven together in such a way that meaning and significance emerge.

Perhaps the greatest significance of the relational aspect of narrative is the intrinsic importance of relationship. Nobel Laureate Jonas Salk says that “the most fundamental phenomenon in the universe is relationship. ... [It is the] fundamental unifying principle in the cosmos” (1983, p. 44 and 37). Frederic Burnham puts it even more succinctly when he says, “Relationships, not things, are fundamental” (1991, p. 5). Of course this concept of the primacy of relationship is woven implicitly and explicitly throughout much of the current literature that considers the new sciences (Whitehead, 1929/1978; Peacocke, 1986; Ford, 1987; Davies, 1988; Hayles, 1991; Lewin, 1992; Doll, 1993). Of Doll’s four R’s, rich, recursive, relational, and rigorous, (1993) it is precisely the relational quality of life that a solely mechanical, quantitative view omits.

Gregory Bateson illuminates the contextual aspect of narrative when he talks about the necessity of context in order to have meaning. He says that context is pattern through time and “all communication necessitates context, that without context, there is no meaning, and that contexts confer meaning because there is classification of contexts” (1979, p. 18). In one context, the word, ‘weather,’ means general atmospheric conditions. In a context of building construction, ‘to weather a sill,’ means to slope it in such a way that water will run
off, but also a weathered sill can be one that has been worn by weather conditions over time. And of course, something quite different is meant when we say that someone is under the weather. "Nothing has meaning except it be seen as in some context. ... It is the context that fixes the meaning" (1979, p. 15 and 17).

Narrative provides context, logic does not. Bateson points out that logic is non-contextual because it is timeless (1979). Logic does not require, nor take into account, time. If A ... then B ... therefore C .... (A) Socrates is a man, (B) All men die, Therefore Socrates will die. Even though this syllogism holds across time, it implies a cause and effect relationship that is not necessarily timeless. Here the 'cause' of Socrates’ death is his timeless status as a man.

Bateson uses a simple example of how the timelessness of logic can be problematic as a model of cause and effect. He uses the simple buzzer circuit to demonstrate his point:

Current will pass around the circuit when the armature makes contact with the electrode at A. But the passage of current activates the electromagnet that will draw the armature away, breaking the contact at A. The current will then cease to pass around the circuit, the electromagnet will become inactive, and the armature will return to make contact at A and so repeat the cycle.

If we spell out this cycle onto a causal sequence, we get the following:

If contact is made at A, then the magnet is activated.
If the magnet is activated, then contact at A is broken.
If the contact at A is broken, then the magnet is inactivated.
If magnet is inactivated, then contact is made.

(p. 65).
Bateson tells us that the if's and thens in this sequence are quite fine as long as we understand them to be causal rather than logical. If we try to fit this into logic, we are left with:

"If the contact is made, then the contact is broken.

If P, then not P.

The if ... then of causality contains time, but the if ... then of logic is timeless" (p. 66).

How then are we to understand what narrative is? Thus far, we have seen it as a term with narrowed usage over time and its importance has greatly diminished. Yet advocates of narrative say it is a mode of thinking (Bruner, 1986), a way of understanding all that we comprehend (Polkinghorne, 1988: Kerby, 1991), a way of knowing (Polkinghorne, 1988), and that the temporal and contextual aspects enable us to interpret and gain meaning (Kneller, 1984; Bruner, 1986; Gadamer, 1989). Indeed, Fuller says that “story is the basis of intellectual cohesion” (1982, p. 134). Narrative may be considered a primary means by which humans make sense of their experience (Gee, 1985; Hymes, 1982).

As a field, the study of narrative is vast and growing. A brief scan of the holdings of a local university library reveal nearly three thousand titles containing the word narrative. Hundreds of the volumes were published between 1990 and 1994. The same library carries two journals devoted exclusively to narrative. The work of both Levi-Strauss and Propp “provided the guiding texts for French structuralism” (Polkinghorne, 1988, p. 85) out of which has emerged narratology -- the theory of narrative (Prince, 1987). The range of research in narrative and narratology is performed by linguists and literarians, psychologists
and psychiatrists, anthropologists and sociologists, reading specialists and educators of various backgrounds, to name just a few.

With so many researchers investigating narrative, why is it still viewed so disparagingly? Mancuso characterizes the conflict between advocates of the narrative mode, narrative structure (Mc Cabe, 1991), or story grammar as deriving from “the clash between basic paradigms which guide the thinking of the commentators” (Mancuso, 1986, p. 99). He states, somewhat reductionistically, that “advocates of the story grammar reason from a contextualist/constructivist (Kantian) paradigm. Critics ... reason from a mechanist (Lockean) paradigm” (p. 99).

This places us back in the realm of epistemological debate. Which form of knowledge or way of knowing is superior? Which is therefore inconsequential? The question in this hierarchial, either/or form is unanswerable. Echoing Bruner, Donald Polkinghorne says that “no single knowledge system is capable of encompassing the full range of the strata of human existence” (1988, p. 3). Scientific and narrative enterprises are different ways to investigate and express various aspects of the world. Scientific inquiry searches for principles or laws. “These principles are general, context-free, usually abstract, and testable only by further formal scientific activity” (Robinson and Hawpe, 1986, p. 114). This contrasts with narrative. “Narrative thought, story, is context-bound, concrete, and testable through ordinary interpersonal checking” (p. 114). A further and important distinction is, “theories do not have a generic form” (p. 114). Whatever relationships and concepts any theory contains will be determined by the object or event under investigation. “In scientific reasoning the similarity of one phenomena [sic] to any other is defined by strict criteria....
Story is flexible where principle is rigid. Unlike a scientific law or principle, a story is open to interpretation” (p. 114 and 115). In paradigmatic thinking, there is no place for consideration of either the resemblances or differences that stories may elicit or reveal. On the importance of story, Rosen relates that it has been said that story “is a primary and irreducible form of human comprehension [and] it is the central instance or function of human mind” (1986, p. 230)

Theoretical physicist and Anglican priest, John Polkinghorne says that because there is “a continuation of the Enlightenment distrust of all knowledge which is not patterned according to the paradigm of scientific method” (1986, p. 6), narrative knowing is neither significant nor valued. Even though the post-Newtonian (or postmodern) science of “quantum theory represents a transformation of our understanding of the physical world” (p. 44), we have difficulty revising our metaphysical concepts. The difficulty of moving beyond the determinism and rigidity of the logico-scientific mode of thought is exemplified by the following quote by Joseph Margolis. He says that we have been driven to concede that the human sciences...may well be significantly different from the physical sciences, both methodologically and ontologically. Language appears to be sui generis: ... inseparable as far as meaning is concerned from the changing, novel, nonlinguistic experience of a people; incapable of being formulated as a closed system of rules ... subject also to ineliminable psychological indeterminacies regarding intention and action. (1984, p. 80)

On the surface, at a literal level, this is true, but a closer examination reveals some of the assumptions about the physical world that are not consistent with postmodern science and therefore create a Cartesian-like split between physical and human sciences. Chance, novelty, open systems and indeterminacy are all characteristics of the physical world at
various levels. There is no need for a one-to-one correlation between types of science. And the tone Margolis uses seems to indicate that concession relegates the human sciences to a second rate status.

In Chapter Two, we saw how the logico-scientific mode of thought developed from Descartes to Newton. Early in this process, narrative knowledge was still privileged. Religion continued to play a primary role in Western culture and religion has always made rich use of narrative. But by the middle of the twentieth century, science had usurped much of the role and most of the influence of religion, and the logico-scientific mode of thinking had clearly declared narrative “immaterial” (Kung, 1988; Lightman, 1991; Schwartz, 1992). The segregation of types of knowledge, ways of knowing into the various disciplines became increasingly rigid with the onset of professionalism. “The striving for professionalization of non-scientific traditions has resulted in their transformation into scientific knowledge” (Bohme, 1992, p. 61). Bohme says that this is not due to “the superiority of science over other types of knowledge but the fact that in our society social opportunities are largely distributed according to certificates of knowledge” (p. 61). This certification of professionalism continues to dominate the field of education.

Throughout human history, we have asked the same sorts of questions about the world that we ask today: how, what, when, why? These questions can be divided into two main realms. How did the universe form? How far away are the stars? What causes a flower to bloom? When did dinosaurs walk the earth? These questions are about the physical, material world. But the ‘why’ questions are different in kind -- they reside in the realm of meaning and purpose. Why was the universe created? What does it mean to be human?
Until the methods of Descartes and Newton were developed and refined, we had very limited abilities to answer the how and when questions. The why questions were asked in the same breath. Together, both sorts of questions formed the whole cloth of the life tapestry. Before, and even during the Enlightenment, there were no scientists per se. Newton studied physics, mathematics, and astronomy but was called a natural philosopher. Underlying the how questions ran the thread of why, weaving the warp and weft threads together.

It is only in this century when science and scientific thinking have became so separate from religion and philosophy that the why questions about meaning have been isolated from inquiry about nature and have lost prominence. With greater and greater degrees of precision, science is explaining the origin of the universe -- what happened, when it happened, how it happened, but science will never tell us why it happened. Science discovers literal, factual information about the physical world. But the "realm of meaning is not a thing or substance, but an activity. Narrative is one of the operations of the realm of meaning" (Polkinghorne, 1988, p. 4). Science functions on the horizontal level of material reality and cannot answer questions in the realm or dimension of meaning; it cannot tell us why the universe was created. The dimension of meaning is the dimension of 'why.'

Interestingly enough, the separation of scientific endeavors from the realms of meaning are not complete. As the dominant mode of thought, the paradigmatic evaluates and passes judgment on narrative. A "common supposition is that explication means improvement of knowledge" (Bohme, 1992, p. 59). The scientific way is to make things
literal (concrete, to the letter), straightforward, explicit. If something cannot be explained literally, it is considered irrelevant.

A good example of how the logico-scientific mode of thinking permeates American thought can be seen in the incredible controversy over one of the central narratives of Western civilization -- the creation story in the book of Genesis. From a logico-scientific point of view, the literal account of creation in Genesis is inaccurate; one might even say absurd. Science assures us a seven-day time frame is several billion years too short. Scientifically speaking, the story is false. Science dispenses with falsity. Therefore, the creation story in Genesis is of no consequence -- to science.

One might expect non-religious scientists to find the account false for two reasons: first, because they apply logico-scientific thinking, and second, because they have no particular interest in its validity anyway. However, they are not the only ones using that mode of thought in relation to the Genesis story. Religious fundamentalists who do have tremendous investment in the validity of the account, approach it from the same paradigmatic mode of thought. Both groups deal with the story on a literal level. Even when the conclusions differ, the method or mode of thinking is the same -- literal, factual. Those who believe the Genesis story as a literal account of creation have had to develop a ‘science’ of their own -- Creationism, in order to substantiate the events as told in Genesis. This kind of religious thinking is religion that has itself been shaped by the logico-scientific mode. The creation account for them is true because it fits the literal facts as defined by their ‘science.’ It is true and meaningful only because it is literal. The account is false to the scientists because it is not scientific, not confirmable by any recognized scientific criteria. It is
important to note that the issue here is not whether the account is, or is not, literally true.
The point is that both groups approach the story on a literal level.

The Genesis account of creation is and always has been, a narrative. As a narrative it is very powerful, rich with meaning. Diane Brunner vividly expresses the heuristic power of narrative when she recounts her own experience of growing up with stories. She says that through story,

I learned about uncertainty, and I learned to do more than just tolerate the ambiguities that seemed so much a part of my world. I learned to take up those ambiguities or conflicts and work them over and over in my mind struggling to find meaning. (1994, p. xv)

There is little to struggle with on the literal level, things are either true or untrue. The two differing accounts of creation in Genesis generate tension -- an energy that both animates and invites struggle. The listener/reader asks, “Why two accounts? What does it mean? What insights can be gained?” There are no fixed answers. Insights, ideas, interpretations, thoughts generated will differ with additional readings over time, and, as the contexts of the lives of individuals or of society change, there will be still more ways to understand. As narrative, the Genesis account invites the reader to wrestle with the story. As narrative, it serves as one vehicle for interpreting the meaning(s) of creation, of humankind, of life, of relationships. And only because it is narrative is it burgeoning with possibilities.

WAYS OF KNOWING

Science is a way of knowing, a type of understanding, a kind of knowledge (Bohme, 1992; Schwartz, 1992), not knowledge or the way of knowing. Bohme emphasizes the need for us to return to an understanding that scientific knowing is “a possible knowledge form
on a wide spectrum of knowledge forms" (1992, p. 13). And it is important to realize that there is more than one form of scientific knowing. “Science is an accumulation of written narratives about our relationship to nature” (Schwartz, 1992, p. xvi). Science is as much a human construction of reality as is art. “Our physics no less than our movies express ideas about ourselves and our possibilities” (Schwartz, 1992, p. xix). This notion that science incorporates more than one way of knowing has hopefully already emerged for the reader. We have seen that Classical or Newtonian mechanics embodies a kind of scientific knowledge and understanding of the world that is characterized by Bruner’s paradigmatic, logico-scientific mode of thought (1986). Quantum mechanics and the new sciences embody a kind of scientific knowledge and understanding of the world that uses, but is not limited to, the paradigmatic mode; it values other knowledge pathways as well (Bohme, 1992; Lewin, 1992; Schwartz, 1992; Davies, 1988; Peacocke, 1986; Bateson, 1979).

In his book, Narrative Knowing and the Human Sciences, Polkinghorne says that “narrative is a schema by means of which human beings give meaning to their experience of temporality and personal actions” (1988, p. 11). Narrative knowing operates as a way to give form to understanding. It provides a framework by which we can interpret past events, plan future actions and understand a purpose to life.

The three aspects of narrative we have focused upon thus far are context, relationship and time. The immense amount of research on narrative structures, story grammar, narrative knowing includes these but goes far beyond the scope of this dissertation. Therefore I will only briefly examine two concepts central to the development
of narrative structures or story grammar: object permanence and time. Time is related to context and object permanence is fundamentally relational.

"Concepts of time, which also form a base for the acquisition of story structure, are interlinked with ability to intercoordinate schemata" (Mancuso, 1986, p. 100). Piaget explained the development of this concept as arising, for example, from the infant's use of a tool such as a stick, or support structure to pull up on, as a way to obtain an object at a distance. Various things take place as the child pulls up and moves toward the object. Of importance here is the fact that the child will "correlate the succession or duration of particular actions with spatial displacements ... It is only once spatial groups of displacements have been constructed that time itself can become objectified" (1969, p. 280-281). Time can link events both chronologically and causally. Time is both linear and circular -- events happen one after the other... incidents occur over and over again.

Object permanence develops as a consequence of repeated sensorimotor actions whereby the infant develops an internalized representation of the object. The infant 'knows' that the object still exists even when it is not within range of sensory perception (Lerner and Hultsch, 1983; Piaget, 1950). This internalization of the external world is vital for a depth of knowing and for continuity of experience. The child 'knows' the object exists because of encounters with it through sensory experience. The passage of time is also necessary so that the child loses sensory contact with the object and regains contact later. Once the concept of object permanence is formed, the child can still know or connect with the object by internally visualizing it. Bohme says that knowing is "the way in which people take part in the things to be known" (1992, p. 56) -- knowing requires participatory experience.
The kind of knowing that Bohme is describing is what Gilbert Ryle calls "knowing how" and distinguishes from "knowing that" (1949, p.27). The distinction between "how" and "that" is fundamentally the difference between facts and experience. Spinoza, writing in the 17th century used the terms "knowledge of" and "knowledge about" to characterize the same concepts (1985). And Donald Oliver makes the "distinction between grounded knowing and technical knowing" (1990, p. 64).

These two kinds of knowledge or knowing are closely connected to the two modes of thought we have examined -- the logico-scientific and narrative. Narrative knowing can be linked with grounded knowing, or knowledge of, or knowing how, through the contextual element of lived experience that is part of the narrative process. The logico-scientific mode fits more closely with knowledge about, knowing that, or technical knowing, via the factual, 'objective' aspect of the scientific method. What is important to note here is that both modes, with the attendant kinds of knowing, are vital for the greatest balance and completeness of understanding. Narrative furnishes a sense of continuity to experience through which we interpret events and find meaning. The logical and scientific provide us with data to enrich and strengthen our interpretations. An example will help clarify the distinctions and connections I am making.

A man wants to travel from New Orleans, LA to Gulfport, MS. The man asks his uncle for help. If the uncle interacts with his nephew on a strictly logico-scientific level, he might simply provide a map of Louisiana and Mississippi. The nephew will presumably be able to make the trip provided he 'knows how' to read a map. If he lacks that technical knowing, he will have great difficulty.
If, on the other hand, the uncle uses a limited narrative, the nephew will have no greater success. Such a narrative might have the uncle recounting his boyhood travels to Gulfport with his family during the summer. He isn't really sure which direction or how far Gulfport is from New Orleans, but he does remember that it took them most of the day to get there. He might tell an engaging story but not one that would help his nephew get to Gulfport.

An interplay of technical and grounded knowing, narrative and logic-scientific modes would include information and explanations left out of the first two examples. The uncle gives the nephew a map. The nephew says he really doesn't know how to use one. So the uncle begins a detailed and somewhat lengthy description of how the nephew's past travel experiences relate to the map -- places the uncle and nephew have gone together and where those places are in relation to New Orleans. Next the uncle gives directions about where I-10, which the nephew will take, is in relation to where they are currently standing. From there the uncle returns to the map and shows I-10, follows the line to Gulfport. He describes landmarks along the way and points out where their various locations correspond to the map.

What I have just described could be called a technical narrative. This technical narrative gives sufficient data combined, with the nephew's previous 'knowledge of' travel, to enable him to complete the trip from New Orleans to Gulfport. It is efficient, effective but not terribly interesting.

If a more complete use of the narrative mode and greater interplay of the technical were employed, the uncle might tell his nephew about the scenic route -- that nearly half the
trip could be taken along the water’s edge where he might see gulls and terns skimming along the shore, a porpoise or two breaking through the calm surface of the gulf. He would tell his nephew what signs to look for when turning off I-10, and show him where that turning was located on the map. A reminder of the last time they went past that spot together would bring a visual image into the nephew’s mind. “You remember, its right there where that fancy new tourist information place is, the one that’s about a mile past that high bridge that goes over the Jordan river -- the one that crosses you from Louisiana into Mississippi.” The uncle could also tell him about possible places to dine along the way. He might reminisce about the little restaurant that juts out over the water at harbor’s edge -- the restaurant where he proposed to his wife. And because the story is being recounted by his favorite uncle, it might be meaningful to the nephew to stop there -- especially now since he too is contemplating marriage. One step deeper into narrative would find the uncle telling his nephew about the mystery and myths surrounding the pile of rocks that are all that remain of an ancient lighthouse -- stories, myths of shipwrecks, pirates and buried treasure.

The descriptions of knowing and the modes of thought mentioned above are quite abbreviated, but serve to make the point that it is only in the interplay of both modes that life can be lived most fully. The deeper the interplay, the richer the possibilities. The technical narrative would have been sufficient to enable the nephew to travel from New Orleans to Gulfport but it would not have added anything significant or meaningful to his life, nor necessarily, would the trip. However, with the enriched narrative, the nephew had the possibility, both through the experience of the narrative itself and by participating in the trip it suggested, of adding new meaning in numerous realms.
The need for an interplay of modes is very much like what Peacocke says about the

generation of life itself — it is only possible through the interplay of chance/randomness and
law/determinism (1986, p. 97). He says that

A universe under the iron grip of a law-like determinism at both the micro-
and macro- levels would simply repeat all its past patterns and not allow the
formation of new ones; whereas a universe in which randomness alone
reigned would not contain any recognizable, enduring forms at all and could
scarcely be a 'cosmos' (p. 180-181)

It is perhaps not too difficult to imagine what life would be if we took narrative to a random
extreme. Most of us know people who live ‘chaotic’ lives. At the extreme, we would not
be able to ever tell ‘fact’ from ‘fiction.’ There would be no real structure of form, plan to
what we did, little would be accomplished. Life would be much like the instability of
schizophrenia.

On the other hand, the logico-scientific mode is paradigmatic. Its dominance is
hardly noticed, nor are some of the effects of its domination. But if taken to an extreme by
eliminating the narrative with its interpretive capacity, it can leach the animation from our
human endeavors with an iron grip. Oliver Sacks describes a patient, Dr. P., who had lost
the ability visually to recognize or represent his world (1987). There was no problem with
his eyes, and, superficially, Dr. P. didn't seem exceptional. Closer examination revealed an
utterly altered life. Sacks said of Dr. P., that

visually, he was lost in a world of lifeless abstractions ... [and] functioned
precisely as a machine functions. It wasn't merely that he displayed the same
indifference to the visual world as a computer but -- even more strikingly --
he construed the world as a computer construes it, by means of key
functions and schematic relationships. The scheme might be identified -- in
an 'identi-kit' way -- without the reality being grasped at all. (p. 15)
Dr. P. was able to continue teaching music and perform most ordinary daily tasks as long as he hummed or sang to maintain continuity. For example, if he was interrupted while eating, he would remain motionless until his wife intervened. If she poured coffee, the smell would stimulate his nose and he would begin eating and humming again. Sacks says that even though the brain does indeed function as a computer, as humans, we are more than that. "Our mental processes, which constitute our being and life, are not just abstract and mechanical, but personal, as well -- and as such involve ... continual judging and feeling also. If this is missing, we become computer-like, as Dr. P. was" (p. 20). And if we omit feeling, judgment, interpretation -- "the personal" -- from the cognitive sciences, we will reduce them to something as debilitated as Dr. P. (p. 20).

In order to live the fullest, most complete and meaningful lives and educate ourselves and others, we need to use all of our mental processes fully. We have spent the last several centuries developing the logico-scientific mode to great advantage. My plea is for us also to examine, explore, develop more fully the narrative mode. Rich, diverse, creative understanding lurks within the narrative realm, waiting to deepen our experiences of living.

Indeed we need to heed Bateson's warning about "the two great contraries of mental process, either of which by itself is lethal. Rigor alone is paralytic death, but imagination alone is insanity" (1979, p. 242). Means to bridge the gap between the two modes of thought or "mental processes" can generate deeper understandings, knowledge and meaning(s) of ourselves, the educative process, and our universe.
CHAPTER FOUR

METAPHOR

By far the greatest thing for a poet is to be a master of metaphor.

(Aristotle, 1951, p. 317).

What is metaphor that Aristotle extols by telling us its mastery is the mark of genius? When usually asked what a metaphor is, most of us will no doubt recall the definition that our English teachers gave us: a metaphor is a figure of speech that makes a comparison between two things without using like or as. Unfortunately, this tells us more about English teachers than metaphors. It reveals that our English teachers used what Black (1962, 1990) calls the substitution theory of metaphor. This theory with the comparison view as a special form, is based in the notion that metaphors are merely figures of speech. Employment of this means that a literal utterance can be substituted for the metaphor or the metaphor is understood as a compressed simile (Black, 1990). However, neither theory or view sees metaphor as a particularly important or necessary aspect of language. It is simply a nice, flowery, poetic addition to literal discourse, adding nothing more than an aesthetic quality to language use, hardly a vehicle for genius. Furthermore, in relegating metaphor exclusively to the backwater of figurative speech, the possibility that it might be something as significant as a mode of thought is hardly credible. However, it is the purpose of this chapter to examine just how essential metaphor is both in language use and in thinking.
The notion that metaphor is profoundly important is not new. Nor is the notion that metaphor is but worthless nonsense. The pattern of acceptance and rejection of the value and importance of metaphor has a nearly parallel history to dominant modes of thought. When logic reigns, metaphor does not. When narrative is important, metaphor is also. As Aristotle says in The Art of Poetry, (1951) “by far the greatest thing for a poet is to be a master of metaphor” (p. 317). He goes on to assure us of the importance of poetry by stating that “poetry is something more philosophical and more highly serious than history, for poetry tends to express universals, history particulars” (p. 302). History deals with dates and facts, what has been, whereas poetry speaks of possibilities and abstractions, of qualities of life. For Aristotle, genius was in the awareness of the “hidden resemblances” in metaphors.

Dewey tells us that “[h]umankind likes to think in terms of extreme opposites” (1938/1963, p. 17). In a polarized view of metaphor, Hobbes and Aristotle represent opposite extremes. Hobbes has no use for metaphors; his disdain is enormous. He insists we use only literal language. In Leviathan, Hobbes complains bitterly of metaphor and says that “such speeches are not to be admitted” (Part 1, Ch iv). If Hobbes had had the benefit of reading Lakoff and Johnson’s, Metaphors We Live By (1980), he may not have completely changed his mind about metaphors, but may have changed the title of his work, once realizing it is a metaphor.

The year 1962 is a milestone in the study of metaphor. Two philosophers, Max Black and Philip Wheelwright each published books on metaphor that helped to bring a depth of scholarship, importance, and diverse interest to an area of study that until then had
received little attention in scholarly realms beyond examination of the use of metaphor in literary works. Wheelwright, in *Metaphor and Reality*, (1962) took a rather traditional philosophical approach by focusing on meaning. He “examine[d] conditions under which and the ways in which metaphor ... can develop into symbol” (p. 69), thereby connecting metaphors with deeper representation and somewhat less directly with the formation of world views. Black, in *Models and Metaphors* (1962) focused on the conceptual analysis of metaphor, and later shifted his focus to functional analysis (1990). Black developed a specific theory or view of metaphor -- an interactive view, drawing heavily on I.A. Richard's work in *The Philosophy of Rhetoric* published in 1936.

During the decade and a half following Black (1962) and Wheelwright’s (1962) publications, interest and research in metaphor began to multiply. “In September 1977, a group of leading philosophers, psychologists, linguists, and educators gathered ... to participate in a multidisciplinary conference on metaphor and thought which was attended by nearly a thousand people” (Ortony, 1993, p. xv) and resulted in the publication of the edited work, *Metaphor and Thought* (Ortony, 1979). Since 1979, there has been a swift elevation of interest in metaphor and research into the nature, role and capacity of metaphor in language and thought. This increased inquiry and investigation spans the disciplines of philosophy of science, philosophy of language, linguistics, psychology -- clinical and cognitive, education and artificial intelligence. In 1980, Lakoff and Johnson published *Metaphors We Live By*, a work that brings together various aspects of metaphor, but

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3 The connections made by Stephen Pepper in *World Hypotheses* between root metaphors and world views will be looked at in Chapter Five.
primarily examines how metaphors dominate our everyday language use. In 1986, a new journal, *Metaphor and Symbolic Activity* was established and in 1990 *Metaphor II: A Classified Bibliography of Publications from 1985-1990* was published with approximately three thousand five hundred references. In an effort to update and revisit *Metaphor and Thought* (1979), Ortony published a second edition in 1993. This volume contains the original twenty-one chapters, updated where possible, and six supplementary chapters exemplifying new ideas from additional disciplines. The debate is far from over. Rather, the depth, profundity and magnitude of metaphor is just beginning to be explored.

**WHAT IS (A) METAPHOR?**

At this point, a definition of metaphor might be deemed appropriate. However, the nature of metaphor is the nature of inquiry. As Doll says “The obverse of the post-structural dictum ‘to know is to kill’ (definitional knowing aborts unborn thoughts) is that ‘inquiry frees’ (opens up possibilities)” (1993, p. 62). Any single definition will restrict metaphor to a distinct realm and confine it in ways that are unacceptable to this work. Instead, I will use a working postulate that is more theoretical than definitive and the assertions implied will be addressed throughout the remainder of the chapter. My theory can be stated as follows:

Metaphor is a way or mode of thought, a kind of thinking and the resultant metaphor is an example of that process. This statements implies that:

1). Metaphor, in what Gadamer (1989) calls the inherent “metaphoricity of language,” is to language what *elan vital* (Bergson, 1905) is to life⁴. The metaphoricity of

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⁴ My intent here is to indicate the vitality of life, not a force or substance separate from it.
language is an appropriate area of research which will reveal much information and many insights; however, it is ultimately as inexplicable as “life force.”

2). Metaphor is both an aspect of language, a creature so to speak, and as Bateson (1987) says, a way of thinking. The inherent tension of metaphor is irreducible. “A metaphor is an intersection of indeterminacy and determination” (Vaught, 1987, p. 288). As a mode of thought, metaphor is to the postmodern science of quantum physics what logic is to the modern science of Newtonian mechanics. A metaphor cannot be reduced to its parts any more than a living creature can be reduced to its chemical components. Accordingly:

a. individual metaphors range in levels of complexity from the equivalent of single celled creatures to the human brain.

b. possibility for the impact of a metaphor on an individual, group, or society varies as its complexity does, albeit not in a linear one-to-one relationship.

c. the efficacy of metaphor depends not only on levels of complexity, but on differing relations among such variables as context, experience or knowledge frames of the hearer, and general appropriateness of the metaphor.

3). Metaphors are inextricably bound up with our beliefs and perceptions of reality. Our views of the world or world views are shaped by metaphors and/or our world views are interpreted through metaphors. “Our ordinary conceptual system, in terms of which we both think and act, is fundamentally metaphorical in nature” (Lakoff and Johnson, 1980, p. 3). Changes in perceptions need new metaphors and likewise, new metaphors engender shifts in perceptions and beliefs.
In order to explicate my own position on metaphor, I will begin with an examination of Black's interactive view. It focuses primarily on word relations and only touches on cognitive aspects. The position that Black takes in developing an interactive view rejects the reductionism of the substitution and comparison views. He agrees that there is always some analogy or comparison in metaphors but that is not sufficient to explain what metaphors do.

Black's interaction view includes the following claims:

1. There are always two distinct subjects in a metaphorical statement -- a primary and a secondary.

2. "The secondary subject is to be regarded as a system rather than an individual thing" (1990, p.59).

3. The metaphor works by "projecting upon" the primary subject some aspects or features that are part of the secondary system.

4. The maker of the metaphor "selects, emphasizes, suppresses, and organizes features of the primary subject by applying to statements isomorphic" (p. 60) to the secondary subject system.

5. "In the context of a metaphorical statement, the two subjects 'interact' in the following ways": (p. 60)

   a. the existence of the primary subject encourages the hearer to select some of the properties of the secondary subject; and
b. invites the hearer to construct a parallel connection-system that fits the primary subject; and

c. "reciprocally induces parallel changes in the secondary subject" (p. 60).

A metaphor, heard too frequently these days, "My classroom is a war zone" can be used to clarify Black's outline. The primary subject is classroom, the secondary subject is war zone. A war zone is to be considered a system rather than a thing, which means that all the interconnected relations of such a system are possibly applicable to, and are then "projected" onto classroom. By selection of the metaphor, war zone, the creator has selected, emphasized, suppressed and organized features of classroom that parallel war zones. The interaction takes place when the hearer begins making the connections between war zones and classrooms. This becomes a reciprocal process when one thinks about both what war zones are like and applies those characteristics to classrooms, and also thinks about what classrooms are like and applies parallel properties in war zones.

Using the above example, how can we detect the difference between the metaphor that calls a classroom a war zone and a simple comparison between classrooms and war zones? A simple comparison is simile, which makes only connections of similarity. It is a direct one-to-one relation limiting the secondary subject to a 'thing' rather than a system. The comparison can then focus on war zone as a 'place.' My classroom is a war zone; war zones are places where people fight; an appropriate literal substitution would then be the statement: A classroom is a place where people fight. Or a compressed simile view would add 'like' to the statement making it: My classroom is like a war zone. This is a logical comparison. As such, neither comparison encourages nor necessitates more than one
instance of similarity and can therefore also be reduced to the literal statement about fights. The interaction that Black insists on moves us beyond this simplistic and reductionist view. It requires more than logic.

One aspect of metaphor that moves us beyond simile is the tension inherent in metaphorical statements (Black, 1962; Wheelwright, 1962). When we state that something IS something else -- my classroom is a war zone -- when it is not literally so, we create tension between the two subjects. Foss states that, “Metaphor is a process of tension and energy manifested in the process of language, not in the single word” (1949, p 61). However, tension is something we constantly try to resolve. This notion of tension and the desire to resolve it brings us into the realm of thought. If the tension metaphors generate can be resolved, dissolved, by reducing them to simple comparisons or literal statements, then there is no uncertainty -- the thing either is or is not what it is compared to. Dewey reminds us that humankind “is given to formulating its beliefs in terms of Either-Ors” (1938/1963, p. 17), and in so doing, reminds us how much we desire certainty.

The desire or quest for certainty is surely one reason metaphor has been so despised and disparaged. Certainty requires direct approaches to specific situations. “A metaphor is an indirect comparison, whereas a simile is a direct comparison, albeit also nonliteral” (Glucksburg and Keysar, 1990, p. 4). By using similes, we include ‘like’ or ‘as,’ which function as subtle markers indicating direct comparisons of similarity. They also serve as subtle reminders that we are indeed making a comparison, not an identity. Metaphors as indirect comparisons imply some things, suggest others, point toward possibilities, generate and create tension. As Black says, the secondary subject is an entire system, not just a thing.
As a system, there are multiple possible relations to draw upon or exclude. Some relations readily fit, others seem obviously unsuited and others still, perhaps the greatest number of possible relations, are uncertain -- they may or may not apply depending on context, temporality or other considerations. Of course this doesn't even take the experiences or knowledge domains of the hearer into account in attempting to ascertain how the metaphor will ‘work’ or be understood.

A further consideration of the interactive aspect of metaphor is the reciprocal changes in the two subjects. As Black puts it, the metaphor “suppresses some details, emphasizes others -- in short, organizes our view” (1962, p. 41) of the secondary subject. Put another way, the metaphor war zone becomes the organizing factor in our view of classrooms. He says we must not “neglect the shifts in attitude that regularly result from the use of metaphorical language” (p. 42). Shifts in attitude include, result in, or occur from changes in perception. This is of fundamental importance in examining the overall importance and impact of metaphor. What shifts in attitude occur when we metaphorically speak of classrooms as war zones?

COMPARING VIEWS

Black's interactive view of metaphor is not incompatible with mine. Indeed, it serves as well for me as a frame from which to work as it does for numerous others currently exploring metaphor (Tourangeau and Rips, 1991; Bredin, 1992; Ortony, 1993; Steinhart, 1994). However, some areas that Black addresses, I will explore from a different point of view or a stronger position. I take a more emphatic stand on the creative power of metaphor
metaphor and therefore see a greater overall impact on, and possibilities for all areas of human endeavor.

By 1979, Black had moved somewhat beyond his original work in Models and Metaphor (1962). He became willing to defend a more distinctly philosophical stand or what he called a stronger creative thesis. He says, “Indeed, I intend to defend the implausible contention that a metaphorical statement can sometimes generate new knowledge and insight by changing relationships between things designated ... To agree would be to assign a strong cognitive function to certain metaphors” (1990, p. 70). He goes on to call metaphors that reveal connections generative and says they function as cognitive instruments. I do not find his statement implausible, indeed, I believe that new knowledge and insight frequently have some connection to metaphor by way of metaphorical thought.

Perhaps Black's most significant statement, hesitant though it is, is one near the end of his essay “More about Metaphor” first published in 1977 (with several later reprints). There he states:

I still wish to contend that some metaphors enable us to see aspects of reality that the metaphor's production helps us to constitute. But that is no longer surprising if one believes that the world is necessarily a world under a certain description -- or a world seen from a certain perspective. Some metaphors can create such a perspective. (1990, p. 74)

Since Black first published that statement in 1977, the view that the world seen is necessarily under “a certain perspective” or perspectives is no longer new or marginal. It is inextricably tied to postmodern science and postmodern thought. The third implication of my theory moves beyond, or perhaps picks up, where Black leaves off. As Boyd says, some “metaphors are constitutive of the theories they express, rather than merely exegetical”
Both the exegetical and constitutive aspects of metaphor necessitate deeper inquiry.

**AREAS OF EMPHASIS**

Black approaches his view of metaphor by attending primarily to metaphors as objects. Metaphors, metaphorical statements exist and are therefore things to be examined. He includes cognitive function as part of what metaphors 'do' but maintains focus on the metaphor itself. The hearer of the metaphor is mentioned in connection with how he or she might be affected by the metaphor, but Black rarely considers how metaphors are generated. When Black uses the term *metaphorical thinking*, he is referring to how a metaphor is interpreted rather than the generation of a metaphor as a way to think about or better understand something new. He mainly mentions the metaphor-maker in reference to the maker's choice of secondary subject and how this choice suppresses or stresses certain aspects of the primary subject. In other words, Black looks at what happens once a metaphor exists. This separation of the metaphor from the metaphor-maker, separates language from thinker, language from thought, whereas, Gadamer's affirmation of the "metaphoricity of language" and "the ultimate unity of speech and thought" (1989, p. 433) precludes a separating of language from the user.

This unitary position is one that becomes central for my inquiry. When Gadamer speaks of language and concept formation, he is erasing lines that have been artificially  

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5 By the metaphoricity of language, I understand Gadamer to mean the necessity of making analogous connections with things already grasped in order to understand anything new. Any new experience must be connected to some previous concept, idea, or experience for understanding to occur.
drawn between linguistics and thought. He says that, "Language is the universal medium in which understanding occurs. Understanding occurs in interpreting" (1989, p. 389). And "human experience of the world is verbal"* (p. 450). Accepting Gadamer’s assertions places me in a hermeneutic frame. It is difficult to imagine ways to investigate metaphor adequately without considering interpretive experience.

Gadamer tells us that verbal (what I am calling language) consciousness always participates in metaphor and lacks the explicit reflective process of logic. "If a person transfers an expression from one thing to another, he has in mind something that is common to both" (p. 429), but this need not be "generic universality." Rather, Gadamer says, the person is simply following his or her expanding experience, which looks for similarities both in appearances of things and/or their meaning for us. "The genius of verbal consciousness consists in being able to express these similarities. This is its fundamental metaphorical nature" (p. 429). And the common figure of metaphor is "only the rhetorical form of this universal -- both linguistic and logical -- generative principle" (p. 431).

Gadamer says that concept formations depend upon the "living metaphoricity of language." Speaking of course implies the use of extant words with customary meanings, but "at the same time, a constant process of concept formation is going on, by means of which the life of language develops" (p. 429). This occurs at the level of both the individual

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Verbal is perhaps an unfortunate translation of what Gadamer is signifying. I understand him to mean language in a very inclusive sense. The term language used this way, includes not only spoken or written (verbal) expressions, but also any other pattern of organizing understanding. Language understood this way would include dance, music, and other modes of expression used to communicate understanding to ourselves or to others.
language user and collectively with the community by whom the language is used and
generated. It is only when the “natural relationship -- i.e., the intimate unity of speech and
thought-- is upset” (1989, p. 433) that we can even talk about separating proper and
metaphorical meanings for words. “What originally constituted the basis of the life of
language and its logical productivity, the spontaneous and inventive seeking out of
similarities by means of which it is possible to order things, is now marginalized and
instrumentalized” (p. 432) merely into a figure of speech, an instrument called metaphor.

This instrumentalization of language is a very significant point. Gadamer emphasizes
it when he states that it is “a fundamental principle that wherever words assume a mere sign
function, the original connection between speaking and thinking ... has been changed into
an instrumental relationship” (1989, p.433). He goes on to say that this altered relationship
of word and sign forms the basis of concept formation in science. This altered relationship
has become so accepted that it takes a special, deliberate effort for us to become aware of
it. The instrumentalization and loss of aesthetic awareness can be seen in the shifting of
words to signs, or put another way, when metaphors take on ‘proper’ literal meaning, the
metaphorical nature of language is concretized. We forget that mathematics is a language
and formulae are metaphors.

The dominant metaphor of modern science is the machine. In Chapter Two, we saw
that one of the strongest advocates of the machine metaphor for humans is Marvin Minsky.
He says the reason we don't simply accept the ‘fact’ that we are machines is our inadequate
concept of machine. He believes that we still think in terms of early machines that were
“simple devices” (1986). This line of thought is neatly linear and can be examined logically.
Fact one: humans are machines; fact two: we don’t accept this because our concept of machine is too narrow; fact three: we need expand our concept of machine from simple to complex; then fact four: now “we’ll find more self-respect in knowing what wonderful machines we are” (1986, p. 30). Machine is not viewed here as a metaphor at all; it is simply what humans are. But Minsky has altered the process, or as Gadamer puts it, has changed the relationship of speech and thought and removed the metaphoricity of language. We can even put Minsky’s assertions into valid syllogistic form, producing an argument he would, no doubt, also view as sound.

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\text{All computers are machines} \\
\text{All humans are computers} \\
\text{Therefore, all humans are machines.}
\]

This logic may be difficult to argue with unless we examine the premises closely. Where do they come from? All the premises are metaphors.

The metaphoricity of language does not easily succumb. A careful look reveals what Minsky has done with the machine metaphor and how what he has done corresponds with Gadamer’s observation that the altered relationship of word and sign forms the basis of concept formation in science. Minsky sees humans literally as machines, and yet that concept continues to interact with the machine metaphor in the “constant process of concept formation” (Gadamer, 1989, p. 429).

In Black’s interactive view, the metaphor of “the human machine” would call humans the primary subject and machine the secondary. Machine, as the secondary subject is to be regarded as a system and aspects of that system apply to the primary subject. The hearer makes connections between machines (as systems) and humans. An extension of
which I believe to be essential, Black considered early on, but later found "in retrospect to be needlessly paradoxical" (1990, p. 59). This extension would include considering the primary subject as a system also. The primary subject, humans, as a system compared to machines would then yield greater connections.

One aspect of comparison, not yet discussed, is the consideration of dissimilarities as well as similarities. In other words, it is not enough to compare one thing with another and think about how they are alike; contrast is vital. We may, at times, gain greater insights from, or enhance our concepts by, examining how the primary and secondary subjects in a metaphor differ from each other. Recognition of difference can help us avoid literalizing metaphors.

But clearly this is not what Minsky is doing. He has literalized the statement "man is a machine" and, interesting enough, has used the reciprocal nature of metaphor and literalized the reverse comparison with the notion that "machines are human." Metaphoric connections with humans as systems may include, but are not limited to, the activity of the brain. However, Minsky severely limits humans when he says that "Minds are simply what brains do" (1986, p. 287) and brains are just computers. Even in reversing the metaphoric subjects, he reduces and literalizes them, thus creating a relationship of identity. By asserting identity, Minsky denies any relevant differences between machines and humans, tacitly commanding us to limit our ideas about human cognition to how computers word.

What are the consequences of this instrumentalization of the language process? By altering or reifying words into signs, taking the living metaphoricity out of language, we change not only the relationship between speech and thought; we change our relationship
with ourselves. If metaphoricality is to language as Bergson's *elan vital* is to life, then the removal of metaphoricality from language is the removal of its life force. By defining humans as machines, we separate humanity from life.

**METAPHORICAL THINKING**

Gregory Bateson says that "Life, perhaps, doesn't always ask what is logically sound" (1987, p. 45). In examining metaphor as a way of thinking and contrasting it to formal logic, Bateson looks at the difference between two syllogistic forms. The traditional or Socratic syllogism — Men die. Socrates is a man. Socrates will die — is of course what I used to describe what Minsky has done with the machine metaphor. Bateson says that this however, may not be how life works. The Socratic syllogism is "a most elegant tool for the description of lineal systems of causation" (1987, p. 43). However, biological life, is not so simple. It is filled with nonlinear patterns, "circular causal systems and recursive systems [that] generate the paradoxes" (p. 43).

The Socratic syllogism is based on the classification of subjects. Socrates is a man and as such, a member of a class. Members of that class die, therefore Socrates will die. This form can only use linear relations. But Bateson, as a biologist, asserts that biological life works more like the following syllogism:

- Grass dies.
- Men die.
- Men are grass.

This type of syllogism, known as affirming the consequent, is thoroughly rejected by logicians. "The grass syllogism is concerned with the equation of predicates .... that which dies is equal to that other thing which dies" (Bateson, 1987, p. 45). This is metaphorical
thinking; a kind of thinking that Bateson says is the way he thinks and hardly foreign to biology. Shared predicates between life forms is what zoologists call homology. Bateson says that “it became evident that metaphor was not just pretty poetry, it was not either good or bad logic, but was in fact the logic upon which the biological world has been built, the main characteristic and organizing glue of this world of mental process” (p. 46).

It is via metaphorical thought that new, different, and, as Aristotle says, “hidden resemblances” are found and made. Linear logic can only analyze what we know. It can tell us more precisely. It narrows things down and tidies them up. It is not messy; it is not generative; it is not creative; it is not alive -- those are the realms of metaphorical thought.

PROBLEMS AND POSSIBILITIES

Where does metaphor fit into Bruner's two modes of thought? Metaphors can be aligned with the narrative; however, a metaphor can also bridge the gap between one mode and another. As stated earlier, we can reduce thought to two modes only in the broadest, most generalizable sense. Metaphors are not the same as metaphorical thinking, rather they generate and are generated by that process. Metaphorical thought is dynamic and often occurs on a preconscious or unconscious level where we grapple to make connections.

Particle physicist and Anglican priest, John Polkinghorne, says “our conscious minds are counterbalanced by an unconscious component, at once creative, chaotic and teeming with symbol” (1986, p. 5). Can we use this as a metaphorical statement to make connections between physics and thought -- a connection between quantum and classical physics, and conscious and unconscious thought? The quantum world, according to the Heisenberg indeterminacy or uncertainty principle, is not the same as our everyday world. It is filled
with paradoxes, where things are and are not something simultaneously. Light is a wave and/or a particle, not either just one or the other.

Metaphors and metaphorical thought are vital because therein lies the capacity to envision a thing as, and not as, something simultaneously. Men are grass. Taken literally, the statement is absurd; understood metaphorically it opens the door into a whole realm of dynamic connections. The equations of predicates - verbs - is metaphorical and dynamic, involving action, movement, change, life. As Aronowitz and Giroux put it, “we need theories that express and articulate difference, but we also need to understand how the relations in which differences are constituted operate as part of a wider set of social, political and cultural practices” (1991, p. 62).

Merchant (1980) and Peacocke (1986) tell us something of the power of metaphor and methodology in shaping our understanding of the world. The machine metaphor is the “structural model for Western ontology and epistemology” (Merchant, 1980, p. 227). The analytic procedure critical for the work of physical biochemists and molecular biologists “becomes almost unconsciously a philosophical belief about biological organisms being ‘nothing but’ the bits into which they have analyzed them” (Peacocke, 1986, p. 7). This “nothing buttery” is a rather natural transition from methodology to philosophy and occurs without reflection. Just such a process happens when Minsky reduces humans to machines and the epistemology is “nothing but” mechanistic.

There is no awe in reductionism. Thomas Berry (1992) says we must go beyond measurement and quantitative terms. If you reduce a symphony to notes and notes to vibrations, you lose the music.
In order to develop fully the possibilities of human thought--logical, metaphorical, narrative--we must think about our thinking about the world. Our world views need to be explicit. When brought clearly into focus, we can reflect upon and examine both our thinking and our doing. Returning to the tapestry metaphor, let us remember that tapestries are woven from the back. This is similar to lived experience inasmuch as in the midst of an experience we cannot see the life story we are in the process of constructing. We must step back or metaphorically go around to the front and view it from a different perspective.

"Mental processes and views of life cannot be separated from physical location [and] our 'world view' as a conceptual framework depends quite literally on our view of the world from a physical place in the universe?" (White, 1987, p. 3). The significance of White's statement is easy to see when we think about the enormous shift in thinking that occurred (and was strongly resisted) when Copernicus revealed our planetary system is heliocentric rather than earth centered. The universe had not changed. What occurred was a "shift of perception ... [that] amounts to drawing new meanings and patterns out of evidence that has always been interpreted in other ways" (Harmon and Rheingold, 1984, p. 186). What new metaphors accompany new perceptions? How does our philosophical, cosmological perspective change when the earth is viewed from space and called 'the big blue marble?'

Views -- pictures, scenes, vistas and beliefs, ideas -- are literal and metaphorical aspects of reality. Engagement in both is essential, but they create a tension that must be held and balanced. We look at one aspect, we look at the other, all the while resisting the urge to see them as either one thing or the other. "There is an integral relationship between the kinds of knowledge claims that we can make in a particular society and the quality of
that society” (Mumby, 1993, p. 2). Knowledge claims pretending certainty and fact, ignore
tension and contingency. Such a society is lifeless, without awe or hope, without meaning
or purpose. If we are to have a society beyond mere measurement and quantitative terms,
all modes of thought are indispensable. As Dewey puts it, “the process of education is the
main business of life” (1948/1957, p. 184). Life, education is not an issue of “a difference
of quantity, but what kind of person one is to become, what sort of self is in the making,
what kind of world is making” (1922/1930, p. 217). The quality of a tapestry resides, not
in its measurements, but in the integrity of the weaving.
CHAPTER FIVE

THE MANDELBROT SET:

Root metaphor for a postmodern theory of education

There is a contemporary philosophic movement, popularly known as pragmatism, which, discontented with the current separation of theory and practice, knowledge and action, regards thought and the beliefs which proceed from it as themselves modes of action and strives to envisage them in their directive office in conduct. (Dewey, 1931, p. 299)

In the Introduction to this dissertation, I wrote that the concept of either/or thinking would be central, and addressed the need to think in terms of both/and. This same theme of avoiding dualisms is a pivotal one in John Dewey’s work. The quotation above is a concise summary of his deep concern with the separations that emerge when either/or thinking dominates — theory is separated from practice, knowledge from action. The extent of his concern is demonstrated in the titles of so many of his works: The Child and the Curriculum; School and Society; Democracy and Education; Philosophy and Civilization; Experience and Education, to list just a few.

The issue of overcoming dualisms is a major part of the educational theory I generate using the Mandlebrot set as root metaphor. A fundamental idea upon which I base my theory is that education is all one with the process of living. An educative or mis-educative “experience occurs continuously, because the interaction of live creature and environing conditions is involved in the very process of living” (Dewey, 1934/1980, p. 35). This idea is expanded as my theory unfolds. I begin with some general characteristics of the
Mandlebrot set fractal to ensure the reader's familiarity with a few of the basic concepts. Other aspects of the metaphor are explicated and explored as I develop the theory in greater detail. Benoit Mandelbrot says that one reason geometry is frequently depicted as dry and cold "lies in its inability to describe the shape of a cloud, a mountain, a coastline, or a tree. [But] clouds are not spheres, mountains are not cones, coastlines are not circles, and bark is not smooth, nor does lightning travel in a straight line" (1983, p. 1). Circles, cones, and straight lines are defined by Euclidean geometry and made manifest in human artifacts. We build houses and cathedrals with Euclidean forms. But Mandelbrot points out that the patterns that "Nature exhibits [are] not simply a higher degree but an altogether different level of complexity. The number of distinct scales of length of natural patterns is for all practical purposes infinite" (p. 1). In order to deal with this reality, Mandelbrot originated and developed a "new geometry of nature" for which he coined the word fractal. Fractals are geometric shapes that are complex and detailed in structure at any level of magnification and tend toward self-similarity. Fractals occur in nature as clouds, coastlines, ferns, mountains and so on, or fractals can be generated mathematically. The Mandelbrot set is a mathematical fractal produced by a non-linear equation, and visually generated by computers. This fractal is particularly useful as a root metaphor because of several distinctive characteristics.

The equation that produces the Mandelbrot is amazingly simple -- \( X^2 + C. \) C is any constant. There are two things to understand here. The first is the idea of iteration, whereby the same process is repeated over and over and over. With a computer this can be done
millions of times per minute. The iterations occur by taking the solution to the equation as the next X value. For instance, zero is used as the 'seed' of starting for X. If 1 is used for C then \(X_0^2 + 1 = 0 + 1 = 1\). Thus 1 becomes \(X_1\). Therefore, \(X_1^2 = C = 1 + 1 = 2\). Likewise, \(X_2^2 + C = 2^2 + 1 = 4 + 1 = 5\). The equation is thus iterated over and over again, where by each solution becomes the next X value -- \(X_3, X_4, X_5, \ldots\). With just a few iterations of \(C = 1\), the X values increase so rapidly they go toward infinity rather quickly.

The second idea to understand is that the list of all X values is known as the orbit of zero because zero is used as the starting point of X. If \(C = 1\), the orbit of X is infinity. If another number such as -1 is used for C, something quite different happens. \(X_0^2 = 0, X_1 = -1, X_2 = 0, X_3 = -1, X_4 = 0\), very quickly we see a pattern whereby the X values alternate back and forth from 0 to -1 and back to 0. This is called a period 2 orbit because the X values alternate between just two points. Other numbers for C produce different patterns or orbits of zero. Some tend to center around a single fixed point, others have orbits or periods of 3, 4, 5, ..., 13, ..., 21, and others go to infinity. The Mandelbrot set [Figure 1] depicted in black, is a graphic picture of all the C values for which the orbit of zero does not go to infinity. Therefore everything black is inside the set and has some finite orbit of zero. Everything outside the set, represented by various colors are C values that go to infinity with varying degrees of rapidity. Rapidity refers to how many iterations occur before the C values begin moving toward infinity. Differences in colors indicate how rapidly the C values move toward infinity. Because the density of the graphing and its generation on a computer, the complexity can be viewed by looking at various points at different levels of magnification.
When viewed as a whole, the Mandelbrot set appears as a black shape that is basically circular with an indentation on one side and a smaller circular protrusion on the other. Extending from all edges are similar protrusions or ‘warts’ so that at first glance

Figure 1

The Mandelbrot Set. The large black circle on the right contains C values that tend to a fixed point. The smaller black circle just to the left, contains C values that tend to an orbit of period 2. The still smaller black circle further to the left, contains C values of period 3. Everything outside the black areas contain C values that tend toward infinity. The difference in colors indicate how rapidly the values move toward infinity. Rapidity means that fewer iterations occur before the c values begin moving toward infinity.
the repeating pattern of circles with warty protrusions can be easily perceived. (Using a little imagination, the black area resembles some of the fish found inhabiting the oceans at extraordinary depths. Therefore, for the sake of simplicity, I will call this black shape a fish.) If any V edge, that is, where a larger circle touches a smaller one, is pinpointed for magnification, the image changes dramatically with each additional magnification at the same point [Figures 2, 3]. Curls and seahorses emerge. Yet with sufficient magnification, two black circles with warty protrusions -- a fish -- re-emerges as another image embedded in the overall pattern [Figure 4].
The principle of self-similarity in linear mathematics means that a repeating pattern can be precisely predicted because the recursion will be identical. In non-linear mathematics, however, the similarity is not identity but resemblance; metaphors are resemblances, not identities. When Benoit Mandelbrot began examining the set very closely, he found that even with greater magnification none of the recurring patterns precisely matched any other. "In fact, no part of the set exactly resembles any other part, at any magnification" (Gleick, 1987, p. 228). The general patterns recur and are "always similar, never identical, fulfilling some mandate of infinite variety, a miracle of miniaturization in which every new detail was sure to be a universe of its own, diverse and entire" (p. 228-229). As we delve deeper and deeper into the set, we see fish again and again but they are never duplicates [Figures 5-8].
To understand a little more clearly what we see when we view different fish, return to Figure 1. This is the whole Mandelbrot set with the largest circle containing C values that tend to a fixed point making the orbit of zero period 1. The circle to the left is period 2, the C values making an orbit between 2 points. The ‘wart’ or circle even further left is period 3. Figure 9, below, is that period 3 ‘wart’ at greater magnification. Extending from the period 3 ‘wart’ is a branching ‘antenna.’ Period 3 has three branches to its antenna. The branches are counted from the junction point just beyond the black area. In each fish anywhere in the set the same is true. If a fish has a period 7 ‘wart’ it will have 7 branches to the antenna; period 13 ‘warts’ have 13 branches. That is, the C values in the third largest black area of a fish have a corresponding number of branchings.
Looking at the main or largest circle of the Mandelbrot set [Figure 1] with its C values of orbit 1, we notice the largest protrusion to the left is, as stated, period 2. This in turn gives rise to a period 3 which we just viewed [Figure 9]. However, if we examine the other smaller and smaller ‘warts’ that protrude from the period 1 circle, they are period 3, 4, ..., 9, ..., 12, 13 .... We can discover this by magnifying enough to count the branching ‘antenna.’ If we continue around the circle where we magnify the V area between the period 1 and period 2 circles, the periods of each ‘wart’ continue to increase. We find both an increase in numbers and in complexity.
Keeping in mind the concept of both/and thinking, and the Mandelbrot set metaphor, I examine theories and how they develop. In 1942 Stephen Pepper first published *World Hypotheses*, a work that put forth what he calls the “root-metaphor theory” (1942/1970, p. 85). This theory posits all philosophic thought as grounded in or developing from root metaphors. Pepper says that when people are perplexed, they look around for some analogy to connect the present problematic situation and their past experience. The philosopher may bring greater intentionality and a broader question regarding the nature of the universe to this process, but nevertheless is doing the same thing. Whatever appears to be the best example for how things are becomes the root metaphor. The individual then analyzes the example or metaphor, “selects its structural elements, and generalizes them as guiding concepts for a world hypothesis” (1982, p. 199). Thus the concepts connected with the root metaphor become “the set of categories of [the] world hypothesis” (1982, p. 199).

Pepper takes virtually all enduring schools of Western philosophy, traces their development, and places them into what he says are the four “relatively adequate hypotheses.” Each world hypothesis has a root metaphor and adequacy depends on how well the hypothesis deals with all facts whatsoever. He says that none of the world hypotheses are completely adequate -- two lack scope but have precision, the other two lack precision but have scope.

The four world hypotheses Pepper uses and their root metaphors are: formism/similarity; mechanism/machine; contextualism/the historical event (context); and, organicism/organism and integration. Though he finds each of the four relatively adequate,
Pepper says, “We need all world hypotheses, so far as they are adequate, for mutual comparison and correction of interpretative bias” (1942/1970, p. 101). This is an echo from Chapter Three where Mc Closky (1990) pleads for all four elements of the rhetorical tetrad to balance the immoderation of any single element.

My reasons for examining Pepper’s work are threefold. First, his notion of root metaphors undergirding world theories has become an extremely important addition to the endeavor of understanding the formation of theories of any kind. Second, even though he compresses all of Western philosophy into four hypotheses, in so doing he focuses on the need for both scope and precision, as well as analysis and synthesis. None of the world hypotheses have more than two of these characteristics. And third, by choosing a postmodern root metaphor for my own theory of education I can utilize his four hypotheses to examine education, not eclectically, but using different metaphors in turn, to view the world from a both/and framework rather than simply an either/or position which necessarily becomes exclusive.

Pepper pleads for thinkers to avoid eclecticism because it draws pieces from hypotheses with differing root metaphors resulting in an incompatible or inconsistent mixture. Dewey (1938/1963) also warns against eclecticism. But Dewey and Pepper voice concerns about eclecticism that emerge from very different frames. Pepper, using an either/or frame or mode of thought, sees either a single metaphor or an inconsistent mix. Dewey says that the task of an intelligent theory is that it must proceed “from a level deeper and more inclusive than is represented by the practices and ideas of the contending parties” (1938/1963, p. 5). We should not choose one side or the other, compromise with a via
media, or "make an eclectic combination of points" (p. 5). Root metaphors represent a deeper and more inclusive level, and the concept of both/and thinking not only allows for more than one root metaphor to organize our understanding of the world, but points to the necessity of multiple metaphors. However, this is not a prescription for inconsistency. Pepper rightly points out that incompatibility comes from choosing points from differing root metaphors, but fails to understand the possibility of using more than one metaphor with the attendant organizing structures of each.

Pepper says that in Art as Experience, Dewey "produces a contextualist-organistic eclecticism (1942/1970, p. 147). Dewey (1939) rejects Pepper's criticism as another misinterpretation of his work. Pepper misunderstands Whitehead as well, and I believe for the same reason. He says, "I do think Whitehead's theory must objectively be taken as an eclectic one. But it is perhaps an eclecticism with the germ of a quite new type of world hypothesis generating in it" (Pepper, 1967, p. 6). Both Dewey and Whitehead in different ways pre-figure postmodern ideas through their employment of new order concepts. Dewey wrote Experience and Education (1938/1963) in a clarifying vein primarily to address issues of confusion and conflict between traditional and progressive theories of education. After stating that an intelligent theory must proceed from "a level deeper and more inclusive than is represented ... by the contending parties," while avoiding eclecticism, he says that, "it means the necessity of the introduction of a new order of conceptions leading to new modes of practice" (p. 5). The Mandelbrot set is generated out of a new order of conceptions.

That short phrase -- "a new order of conceptions -- is fundamental to understanding what Dewey is about. Either/or thinking is an old order concept and is highly restrictive;
everything is understood in terms of analysis or synthesis, wholes or parts, cause and effect.

Pepper, caught in either-or categorizing and unable to fit either Dewey or Whitehead into existing hypotheses, chooses the only known alternative -- eclecticism. This is not surprising when Pepper's *Concept and Quality* (1967) reveals that the "new" hypothesis Pepper is proposing is really a form of old line behaviorism. He calls it selectivism with the root metaphor "the purposive act," apparently missing its deeper atomistic roots in mechanism.

Postmodern concepts are like Doll's description of postmodern art and architecture. He says they are "Janus-faced, indicating a present entwined with its past and future" (1993, p.8). Implicit in his statement is a difference in the concept of time from the modernist linear notion of past|present|future -- separate, lined-up, facing the same direction. This new order concept doesn't simply turn the faces in both directions simultaneously. There is also an intertwining that is difficult to represent -- pastâ†’presentâ†’future; there exists within the present both a pointing toward and an embedding in, the past and future simultaneously.

Postmodern concepts, like postmodern science, always keep relationship as an essential aspect of the concept. Time is not merely separable into *the* past, *the* present, and *the* future as if time were merely isolated bits. Rather, time is viewed as both that which can be separated out for specific purposes and the interrelationships of that time to its past and future. For instance, the 1920s as a time period is related to and to some degree constituted by the past and to some degree constructs the future. Also, the past and possibilities for the future are necessarily part of what constitutes the 1920s. The embedded interrelatedness of pastâ†’presentâ†’future, is similar to the embedded interrelationships of all the fish in the
Mandelbrot set. They may be looked at and examined separately but are inextricably connected to one another and the whole by threads that are often unseen.

One of the greatest difficulties in expressing new ideas or concepts is the limits imposed by existing language. Mandelbrot needed to coin a new term, fractals, and develop an entire geometry to explain his thoughts. Whitehead did much the same in *Process and Reality* (1929/1978) where he coins new words. Dewey, on the other hand, in pragmatic fashion, used existing terminology to express himself. Without new markers to alert the reader’s attention to the radical nature of his ideas, Dewey is often misunderstood, while Whitehead is simply not understood. Michael Elderidge (e-mail conversation, Dec. 1995) says that Dewey uses “conventional language in unconventional ways.” Conventional readings of Dewey from within an either/or frame have produced two main types of opinions regarding his work. One view of his work portrays him as tremendously inconsistent because he does not strictly adhere to linear categories and exclusively analytic rules; those of this opinion dismiss him altogether. The other view, focusing heavily on method, embraces him enthusiastically, not troubled by what does not fit neatly together. Ironically, their interpretation of his method represents two extremes. When focus is on method alone, Dewey can be read as either a linear, step-by-step empiricist adhering closely to the scientific method, or as a “progressive” who wants few and flexible rules. Both are extremes against which Dewey fought (1929/1954; 1938/1963). But Dewey isn’t either of these; he is neither inconsistent nor a methodist. To begin to understand what he is really about requires a position beyond either/or thinking where we can explore his ideas that don’t fit neatly into old order categories. Dewey says, “For whatever else pragmatism is or is not, the pragmatic
spirit is primarily a revolt against that habit of mind which disposes of anything whatever -- even so humble an affair as a new method in Philosophy -- by tucking it away, after this fashion, in the pigeon holes of a filing cabinet” (1910, p. iv). Pigeon holes in a filing cabinet makes a nice metaphor for the paradigmatic mode of thought.

Thus far two metaphors, tapestry and the Mandelbrot set, have been used to explore ideas about life and education. Why did I move from tapestry, an object that is familiar, to one that is not familiar, the Mandelbrot set? There are several reasons for the change. One metaphor cannot hold or exhibit all ideas. Mixing metaphors rather than adding new ones results in the kind of eclecticism that both Pepper and Dewey disdained. Dewey’s use of conventional language in unconventional ways results in misunderstandings because his interpreters do not always realize that what he is saying is truly new. Tapestry as a traditional object, can become a conventional metaphor. Whereas the Mandelbrot set requires the reader to think new thoughts. The newness of the metaphor places greater demands on the process of reflection. However, connections between the two metaphors help us to bridge gaps that may exist between the familiar and the unfamiliar, allowing us to better understand the new.

Kliebard utilizes the notion of root metaphor in theory development when he says, “a large part of what we call theory consists of the effort to extend by analogy understandings, concepts, and explanations that exist in one domain over to another” (1992, p. 208). He does not equate metaphors and theories but says that “it can be argued that metaphors and theories have in common the effort to organize thinking by setting in motion an interaction between the familiar and/or the comprehensible on one hand and the thing to
be explained on the other” (p. 208). Nagel says that theories differ from metaphors in that theories can be understood as “any more or less systematic analysis of a set of related concepts” (1969, p. 10). If metaphor is the root of analysis, then theory is the explication. In other words, when the metaphor is examined for structural or systemic elements and these are generalized, a theory begins to emerge. Just as some theories are more or less accurate than others, some metaphors may be trivial or profound, useless or generative. And both theories and metaphors have the potential to be misleading, as Bowers and Flinders, in Responsive Teaching (1990), point out. Dewey, as a pragmatist, says a philosophy that chooses “the work of projecting hypotheses for the education and conduct of mind, individual and social, is thereby subjected to test by the way in which the ideas it propounds work out in practice” (1910, p.18). Is the Mandelbrot set a good metaphor for a postmodern theory of education? Will the application of that theory in Chapter Five demonstrate its ability to generate intelligent actions that lead to positive consequences?

The OED gives the etymology of theory from the Greek *theorein* meaning a looking at, viewing, contemplation. Drawing on the Greek, Kliebard says that, “a theory, therefore, in its root meaning, may be construed as a way of seeing -- but, it may be argued, a particular way; it is a way of seeing one thing as if it were another” (1992, p. 205). Kliebard in using a more inclusive sense of the term theory, one rooted in its historical meaning, moves beyond the restrictions of the modern fixed sense of theory as specific and highly systematic, to a more metaphorical understanding. Kliebard’s definition of theory therefore, allows us to understand Pepper’s world hypotheses or world theories, as four distinct ways of seeing the world via their root metaphors. This is to say that we organize our conceptions
of the world according the structural features of the root metaphors we use. Sometimes we, as Pepper does, believe our root metaphors to be reality itself. However, metaphors and theories are only ways to organize, they are not descriptions of reality.

What metaphors form the roots of Dewey's ideas? In accusing Dewey of being an organic-contextualist, Pepper identifies two metaphors that might be connected with Dewey's thought -- organism (integration) and historical event (context). Yet, as a predecessor of post-modern thought, there can be no single metaphor to adequately express Dewey's concepts of growth and education. At first glance, organism would seem to have possibilities. However, Dewey points out that when some of Hegel's followers tried “to reconcile the claims of the Whole and of individuality by the conception of society as an organic whole, or organism” (1916/1966, p. 60) this created another problem. The social organism was “interpreted after the relation of the organs of the body to each other and to the whole body” (p. 60) which meant that each organ or part of the body has a particular function, such that a hand is, and can only be, a hand. “The notion of ‘organism’ is thus used to give a philosophic sanction to class distinctions in social organization” (p. 60) much like Plato's sense of individuals having a pre-ordained place in the fixed world order. This contrasts with an understanding of the importance of each part to the functioning of the whole without privileging some parts over others. Ecology and ecosystem as words that imply interrelationships and interdependence -- concepts of primary importance to Dewey -- are more generative metaphors. Balance is essential for ecosystems to flourish and for Dewey "one of the weightiest problems with which the philosophy of education has to cope
Robert Bellah and his coauthors use the term “social ecology” to express the idea of our fundamental embeddedness within society (Bellah et al. 1985), an idea consistent with Dewey’s notion that it is only within a social context that we become fully human (1916/1966). Pepper’s second metaphor is the historic event or context by which, he says, pragmatists “mean the event alive in the present” (1942/1970, p. 232). This is more than basic context; it is the continuing life story. For Bellah, social ecology refers to a community with a shared history; a community constituted by its narrative. Perhaps narrative or story is a useful metaphor for Dewey even though he does not use either term. But this concept is implicit in his insistence of the folly of generalized notions about humanity. He says, “‘individual’ is not [just] one thing, but is a blanket term for the immense variety of specific reactions, habits, dispositions and powers of human nature that are evoked, and confirmed under the influences of associated life” (1920/1948, p. 199-200). The same problem adheres to the term social. “Society is one word, but infinitely many things. It covers all the ways in which by associating together [humans] share their experiences, and build up common interests and aims” (p. 200). He says this includes everything from street gangs, to trade unions, to villages and international alliances. And this can be adequately expressed only through story -- the telling of their particular and constitutive narratives. And “the stories lives tell” as Witherell and Noddings (1991) put it, require multiple metaphors for the multifaceted nature of life.
What structures or aspects of the Mandelbrot set metaphor can I use for developing my theory -- ones that avoid the dualism of separating theory from practice -- and allow for the multi-facets of Dewey's ideas? One characteristic relates to the different levels of magnification and what these levels can represent. If one looks at Figures 12, 15 and 17 without either familiarity with what is being viewed or an explanation of how they are related, there is no way to understand them as being different levels of magnification of the same set. It would be somewhat like looking at a picture of a sheep in Figure 12, a sheep's liver in Figure 15, and a liver cell in Figure 17 and having no experience of biology. Without an understanding of the relationship among such items, the pictures would make little sense.
Dewey says that there is a "constant task ... to establish working connections between old and new subject-matters. We cannot lay hold of the new, we cannot even keep it before our minds, much less understand it, save by the use of ideas and knowledge we already posses" (1929/1958, p. viii-ix). When we have the intervening pictures [Figures 13, 14, and 17], or explanations of how Figures 12, 15, and 17 are related, the gap in our understanding narrows. "The greater the gap, the greater the disparity between what has become a familiar possession and the traits presented in new subject-matter, the greater is the burden imposed upon reflection; the distance between old and new is the measure of the range and depth of the thought required" (p. ix.). However, if the gap is too large, that is, intermediate information for generating connections between Figures 12 and 17 is not available, then no amount of thought will close that gap. When we have Figures 12-17 to view together, the relationships among Figures 12, 15, and 17 are readily seen, gaps are closed through the visual connections making new information more easily accessible.

At this point, a distinction needs to be made between the traditional cross-sectional examination of an entity or situation and multiple levels of magnification of a fractal. With a cross-section you have only that, a single piece intentionally separated out from the whole for examination. With a microscope, even an electron microscope, one is able to examine only that particular piece or section at various degrees of magnitude. The entity itself is elsewhere, isolated from the piece under examination. With the Mandelbrot set however, one can zoom into and out of differing degrees of magnitude without being cut-off from the entire set. Different levels and patterns can be examined within the context of the whole.
Life, which includes education as all one with the process of living, is like the entire Mandelbrot set. Stating that education is like the complete Mandelbrot must not be
construed as an argument for holism. Pepper makes the point about the theories he examines that two are analytic and reductionistic in nature and that two others are synthetic and holistic. Reductionism and holism are both needed for a well developed understanding of education, life, the world, but each must be employed within an applicable domain. Otherwise, both holism and reductionism can become forms of blindness, which certainly won’t do if theories are ways of seeing. For example, somewhere around the age of one year, normal human infants move from predominantly perceiving the world by touch to primary reliance on sight. The physician Paul Brand relates the experiences of Marius von Senden with sixty-six patients who were blind from birth and later received their sight through surgery. One of the greatest difficulties of the newly sighted was “mastering such advanced concepts as spatial wholeness, or two-dimensional depth perception” (Brand and Yancy, 1984, p. 156). A girl, after receiving her sight “realized that she had never conceived of her dog as a whole, made up of a head, ears, and legs joined together to make one animal. Like the proverbial blind men feeling an elephant, she had never touched all the parts at once and thus had not pictured the dog as a whole being” (p. 156). When we conceptualize only parts, we suffer a kind of blindness that does not allow insights of wholeness. If we look only at Figures 12, 15, and 17 of the Mandelbrot set, without a sense of wholeness, we are unable see how they are connected to the entire set. When we examine aspects of education separately from life, we encounter the same problem.

Holism can be a form of blindness as well. As the never sighted cannot conceive of spatial wholeness, holism can induce us to lose sight of the parts and their interrelations. Frank White (1987) describes the experience of twenty-four astronauts and cosmonauts as
they traveled away from the planet. When they reached a distance from earth where they could no longer see distinct geographic features, their perceptions began to change. When neither continents nor oceans were distinguishable, earth was perceived as a whole. This is now known as the “overview effect.” This effect had a profound impact on most of the astronauts. It both literally and metaphorically changed their point of view about their world. They experienced a new realization of the artificial nature of national boundaries. Be that as it may, due to this holistic view, they could no longer see the ravages of war and famine, nor could they see the beauty of a flower or the complexity of an ethnic culture in a market square. The earth was homogenized. If we view education only as the fish image of the Mandelbrot set, we are blind to the marvelous complexity embedded within.

EDUCATION AS THE MANDELBROT SET

What do I mean when I say that education is the entire Mandelbrot set? Dewey’s numerous definitions of education are all related and reveal various aspects of his fundamental idea that the process of education is “the main business of life” (1948/1957, p. 184), a process which continues as long as life endures. He gives a technical and pragmatic definition of education in Democracy and Education, stating that it is “that reconstruction or reorganization of experience which adds to the meaning of experience, and which increases ability to direct the course of subsequent experience” (1916/1966, p. 76). Thus the educational process is not something that can be separated from life experience. He says that “the educative process [like life itself] is its own end, and the only sufficient preparation for later responsibility comes by making the most of immediately present life” (1916/1966, p.310). The focus is on experience now, not a preparation for some never-present future,
forever just out of reach. He says that education is not “a preparation for something coming later” (1948/1957, p. 184). However, in its “nowness,” education like the Mandelbrot set has a recursive past and a yet to be explored (magnified?) future. Because Dewey sees all experience as participating in the (educative) process of living, he says, “Since growth is the characteristic of life, education is all one with growing; it has no end beyond itself” (1916/1966, p. 53) -- nor does the Mandelbrot set.

One way to view the Mandelbrot set as education, in light of my view that education is contiguous with life, is to see the fish in figure 1 as a life, an individual. All the other fish that appear at various levels of magnification can then represent that person in the various settings or contexts of life experiences. All the fish are similar yet none are exact copies because, as Dewey says, “Every experience enacted and undergone modifies the one who acts and undergoes ... [and] it is a somewhat different person who enters into [subsequent experiences]” (1938/1963, p. 35). Each time a fish emerges it is surrounded by a variety of images, different environments which may be understood as various contexts of experience -- different ages, places, roles, and so on. The fish might be observed in the center, at an edge, or anywhere in between, and is always somewhat different in each context. The Mandelbrot set as a whole, like life, is infinitely complex.

Using the Mandlebrot set to represent life elicits another feature of the fractal metaphor -- the difference between complex, non-linear systems and simple, linear systems. The difference is in relationship. Linear relations are proportional, predictable, and can be expressed on a straight line graph. Linear systems are simple in their modularity; they can be taken apart, and put back together, and all the pieces add up (Gleick, 1987).
Mandelbrot set, on the other hand, is non-linear. The relations within a non-linear system are not proportional, and if added together, produce unpredictable results. As Gleick puts it, “Nonlinearity means that the act of playing the game has a way of changing the rules” (1987, p. 24). That is, the patterns that emerge -- fish, seahorses, octopi -- all have different foci as centers of attraction, yet, all are connected. The rules change but are self-similar because the same formula governs all the ‘sea-animals’ generated. This echoes Dewey’s statement that the process of undergoing experience alters the one who undergoes the experience, which of course, also alters the context in which the experience is had. Each human experience has a different focus as its center of attraction, which in some way alters all subsequent experiences. When we change the focus, we change the nature of the experience and subsequent experiences.

Every metaphor includes some things and excludes others. Tapestries may be more complex than simple cloth but are linear constructions nonetheless. A change from the tapestry metaphor to the Mandelbrot set allows us to move from linear to non-linear concepts. However, we lose the pictorial narrative visible across the face of the tapestry.

Living systems are non-linear and living systems include individual humans as well as ecological or sociological systems. Non-linear equations have traditionally been relegated to the Appendices of Math books as quirks of little interest or importance. Recognizing the significance of non-linearity is a new order concept. Non-linearity does not fit neatly into Newtonian mathematics and physics with laws of order and determinism. But the dynamics of life are not simply neat and orderly either. People, as individual living systems and as parts of other living systems, because of infinite complexity, have more in common with
Mandlebrot sets than with machines. This is not to dismiss the linear aspects of life but to state that they are contained within the whole. As Peacocke says, "life is generated out of a combination of law and chance, determinism and randomness; a combination that is inherently creative and involves an infinite increase in complexity" (1986, p. 97).

Fundamental to Dewey’s ideas regarding experience is what he calls the “principle of continuity of experience” (1938/1963, p. 35). This principle states that all experience occurs in such a way that something from past experience is brought into the present; the past interacting with the present alters and shapes future experiences. In other words, because some portion of the past is always brought into the present and these together affect the future, there is continuity of experience. He goes on to say that, “Growth, or growing as developing ... is one exemplification of the principle of continuity” (p. 36).

Growth is a concept that Dewey uses to distinguish between educative experiences and miseducative experiences. Growth is “cumulative movement of action toward a later result” (1916/1966, p. 41). Though essential for educative experiences, growth is not sufficient in itself. The “direction in which growth takes place, the ends toward which it tends” (1938/1963, p. 30) are two criteria that help distinguish educative from miseducative experience. Dewey says that one might grow in skill and mastery as a burglar, but this would constitute miseducative experience, because for Dewey, “growing as education” must promote growth in general, not just teach a specific skill, and must not cut the individual off from growth in new directions. Dewey uses growth as a burglar as miseducative because “education, in its broadest sense, is the means ... of social continuity” (Dewey, 1916/1966,
To become a burglar, no matter how skilled, sets one outside the social milieu that helps us become fully human. It closes many new directions for that individual’s future.

Two other aspects of experience, the passive and active characteristics, must both be included for an educative experience to take place. Dewey calls the active aspect “trying,” which carries a degree of intentionality. The passive aspect, he calls undergoing, which brings with it the consequences of the experience. The connections we make between the active and passive -- intent and consequences-- are what give meaning to our experience. If we make no connections, our experiences have no meaning for us. As with Figures 12, 15 and 17 of the Mandelbrot set -- the example of the sheep -- without a connection there is no meaning or understanding. Dewey says that, “The old takes on new color and meaning in being employed to grasp and interpret the new” (1929/1958, p. ix). And James Macdonald makes an even stronger case when he says that, “The fundamental human quest is the search for meaning and the basic human capacity for this is experienced in the hermeneutic process of interpretation ... This is the search (or research) for greater understanding that motivates and satisfies us” (1995, p. 176).

A final criterion to examine for distinguishing educative from miseducative experiences, is the interactivity between the individual and the environment. Dewey says the interaction of these two constitutes a situation. If focus is placed solely on either the individual (as romantic forms of progressivism did) or the environment (as behaviorists do) rather than the situation itself, which contains both, integration of experiences and the relational development of connections will not take place. Life is lived situation to situation and in order for these situations to generate educative growth, they must contain a sense of
continuity with each other and prior experiences. Dewey says, "One situation becomes an instrument of understanding and dealing effectively with the situations which follow. The process goes on as long as life and learning continue" (1938/1963, p. 44). Without such relational interconnections, the process of experiencing becomes one of fragmentation. We develop a sense of separation and isolation and inhabit a world made up of disparate and ultimately alien parts. Dewey says that taken far enough, the division within the person will produce insanity. "A fully integrated personality, on the other hand, exists only when successive experiences are integrated with one another. It can be built up only as a world of related objects is constructed" (p. 44). This sense of relationality -- situation to situation -- has a pragmatic practicality to it (abduction) that the formal logic of deduction and the mathematical probability of induction lack. This relationality is that of lived life where the experiences of life are reflected on. And the results of reflection "explain the primary objects [of experience, and] enable us to grasp them with understanding, instead of just having sense-contact with them" (1929/1958, p. 5). This situational interconnectedness is different in kind from the formal, part-whole relationality expressed in deduction and induction. It is recursive. It bears analogous relations with the self-similarity expressed in the Mandelbrot set. Each fractal examined is different from, yet similar to, the fractal from whence it came and into which it will emerge or grow as the process of recursion continues.

To summarize, in order for experiences to be educative they must (1) involve growing that promotes growth in general and in ways that allow us to regulate and choose future directions, (2) they must have meaning for us, which is made possible by making connections with various aspects of experience, and (3) they help to integrate more fully our
personality by having both a continuity of experience and a continuity of meaning across situations. The degree of educative significance will reside in the active union of continuity and interaction -- a union which can be a transformative process.

The characteristics needed for educative experiences just described do not happen accidently. Intentionality must be brought to bear. Experience must be reconstructed or reorganized to yield its fullest benefit -- to be educative. "Thinking is a method of reconstructing experience" (1948/1957, p. 141). Just as all growth is not educative, all thinking is not either. Here Dewey is calling for reflective thinking, reflective knowledge, reflective inquiry, thoughtful experience. This concept recursively brings us back to the active or trying aspect of experience.

Dewey describes the process of reflection, a secondary level of experience, as one in which we step back from an experience and treat it as if it were merely an external event. From this new, but interconnected position, we are able to generate abstractions and generalizations even though the individualizing aspects are still within us. "But we return from abstractive thought to experience of them with added meaning and with increased power to regulate our relations to them. Reflective knowledge is the only means of regulation" (1929/1979, p. 219). This is how we learn from an experience and are transformed by experience. "To ‘learn from experience’ is to make a backward and forward connection" (1916/1966, p. 140) between our actions and the consequences; between being acted upon by the environment and our response or reaction. Each endeavor of reflection allows for the possibility of transforming experience and opens us to further reflection and additional transformations in the directions of our choosing. Dewey’s concept of reflection
suggests the process of metaphoric thought. As stated in Chapter Four, metaphoric thought is dynamic and often occurs on a preconscious or unconscious level where we grapple to make connections. For this process to be strongly educative, it must be active in Dewey’s sense of including intentionality.

The ideas of backward and forward connections, intentionality, and possibilities for transformation can be linked to the Mandelbrot set. Because the images are generated by computer, the full impact or depth of experience is only possible through an interactive or video medium. When one area of the screen displaying the fish is pinpointed, then magnified again and again and again, a whole universe of beauty and unexpected complexity emerges. When one returns to the original fish and pinpoints another area upon which to concentrate, the images at greater and greater levels of magnification continue to have self-similar patterns, but because of the endless complexity, what is seen is always different, the same yet unimaginably unique. The ‘stills’ included in this work cannot convey the sense of awe that attend interactive explorations. The difference in quality of experience is much like the difference between seeing snapshots of an individual from infancy to adulthood, and the lived experience of watching that person grow up. In order to view more than the original fish, it is necessary to zoom into and out of various areas and at differing degrees of magnitude. This zooming in and out, is a kind of backward and forward viewing by which we begin to experience the complexity of the set. And what we find in each new level allows us to choose in which subsequent direction to go. However, if we stay only in one place, or at a single level of magnification, we are cut off from all other possible experiences.
Dewey's description of reflection brings us back to the root metaphor of my theory. As Kliebard says, "a theory ... may be construed as a way of seeing ... one thing as if it were another" (1992, p. 205); metaphors are ways of seeing one thing as if it were another. Above, I used the fish to represent an individual, the same individual at various times or in differing environments. Another way to interpret the recurring pattern of the fish is to let each fish represent a different individual. There are two metaphoric aspects here. One is that within the Mandelbrot set, at all the possible levels of magnification, there are an infinite number of self-similar fish. Second, is the idea that even though self-similar, each is unique. This metaphoric connection can help us realize that each individual has various ways of seeing, organizing the world of personal experiences, yet each of us tends toward a particular, or favored mode. This is like the center of attraction for each fractal fish. In the classroom, we need to realize that each student is embedded within an environment that is not entirely visible to us, and that environment to some degree is generated out of a center of attraction -- her or his primary mode of thought. An example may help clarify my point.

While observing a social studies methods student teach a lesson to a third grade class as part of her course, the following incident occurred. The student prepared her lesson on geographic mapping from the standardized Curriculum Guide used by the state. Her objective was to teach the children about maps and how they convey information about location. The specific geographic areas she used were the school at which the lesson took place, the town in which the school was located, and the state in which the town was located. In order to demonstrate the connections among these places, she drew a rough circle on the board and told the students that circle represented their school. Next she drew
a larger circle around the first one and said that was the town. Lastly, she drew a third, still larger circle around the second one to represent the state. When finished, the image on the board consisted of three circles, one within the other.

She then asked the students to tell her what was on the board. One boy, Arthur, raised his hand. When called upon, he said it looked like a basketball. Now Arthur is one of those students who has a ‘reputation’ for making strange, inappropriate comments. The student teaching the class responded with a frown and a non-committal nod of her head. She immediately called on another child.

The questions I raise with my thoughts about metaphor are these: What was Arthur talking about? Was Arthur using another mode of thought, another frame of reference, a metaphor to try to make sense of what was happening? I was sitting just behind Arthur, and from my position, I have to admit the drawing on the board more closely resembled a basketball than any map I have ever seen.

Metaphors can be roots for theories. Theories can generate multiple metaphors. Metaphors can be vehicles of inquiry. Metaphors begin the process by which we construct our understanding of new information or a view of the world. The Mandelbrot set, narrative, story, ecology, ecosystems all have connections with the ideas presented here. How can these metaphors generated from my theory be used in practice?
CHAPTER SIX

THEORY & PRACTICE

There is no inherent opposition between theory and practice: the former enlarges, releases and gives significance to the latter; while practice supplies theory with its materials and with the test and check which keep it sincere and vital. (Dewey, 1929/1954, p. 36)

A great man is not a man so strong that he feels less than other men; he is a man so strong that he feels more. And when Nietzsche says, “A new commandment I give to you, Be hard,” he is really saying, “A new commandment I give to you, Be dead.” Sensibility is the definition of life. (Chesterton, 1905, p. 89)

If, as Dewey says, there is no inherent opposition between theory and practice, why do so many theories fail in practice? Why is so much of practice inconsistent with theory? These are enormous questions and Schwab and Dewey both provide sign posts that point to why there is no facile, automatic connection between theory and practice. That is, there is not necessarily an easy flowing out of practice from theory especially when theory turns in on itself and is left unexamined. Schwab says, that “theoretical constructions are, in the main, ill-fitted and inappropriate to problems of actual teaching and learning. Theory, by its very character, does not and cannot take account of all the matters which are crucial to questions of what, who, and how to teach” (1978, p. 287). That is quite a forceful statement, one that draws on the modernist use of theory. He goes on to explain that "theories cannot be applied as principles to the solution of problems concerning what to do with or for real individuals, small groups, or real institutions located in time and space -- the
subjects and clients of schooling and schools” (p. 287). On the one hand, this is a surprising comment from someone with roots in pragmatism. On the other hand, the context from within which Schwab writes sheds some light on his statements as well as the whole issue of theory/practice.

When Schwab wrote the preceding words, he also said, “the field of curriculum is moribund [because of] inveterate, unexamined, and mistaken reliance on theory” (1978, p. 287). He says that the curriculum field has adopted “theories (from outside the field of education) ... and has used these borrowed theories theoretically, i.e. as principles from which to ‘deduce’ right aims and procedures for schools and classrooms” (p. 287). An unexamined reliance on theory is the heart of this problem, that is, the problem is not really with theory itself so much as the narrow use of the term. Nor is the difficulty with principles, which are necessarily grounded in one theory or another, but in the lack of reflection and examination which allow gaps between theory and practice to occur unchecked.

Schwab’s concern is similar to that of Dewey in that both see the disastrous consequences of separating theory from lived experience. Schwab’s concerns primarily focus around theories, especially those in the 1970s that came directly from psychology into education. These theories, emerging full-fledged from the laboratory into the classroom, characterize an approach to theory that clings to the Greek root theorein, to view, where the viewer is understood only in terms of spectator. These psychological theories were often unexamined and yet were, as are all theories, based on certain assumptions. One assumption of the behavioral theories was that what occurred in laboratory experiments, done primarily with animals, would be directly applicable to classrooms. A closer examination of this
The underlying assumption reveals several other assumptions: the behavior of humans is virtually the same as that of animals (this is especially applicable to the notions of conditioning) and classrooms are simply real life laboratories where experiments can be further tested. There are of course, other assumptions that can be discovered by looking closer still -- as with the Mandelbrot set, a closer examination at greater magnification reveals what cannot otherwise be seen. The point here is the need to examine carefully whatever theory or practice is at hand.

Schwab’s concern is akin to Dewey’s. Dewey is troubled by the consequences of separating theory and practice from each other and from life. He says the problem is not any opposition between theory and practice but that “there is a whole lot of opposition between human beings who set themselves up as practical and those who set themselves up as theorists, an irresolvable conflict because both have put themselves into a wrong position” (1929/1954, p. 36). This “wrong position” is dualistic and extreme. He says that the history of schools is like a pendulum swinging between two extremes, traditionalists and progressives. He goes on to say that pendulum is not really an apt metaphor because of two things: first, most schools simply stay with one extreme and second, the metaphor “seems to suggest that the solution lies in finding, a mid-point between the two extremes which would be at rest. But what is really wanted is a change in the direction of movement” (p. 33, emphasis added). This is very close to his call for “a new order of conceptions leading to new modes of practice” (1938/1963, p. 5) that we looked at in Chapter Five.

Why didn’t the “so-called advanced schools of educational thought” (1929/1954, p. 37) flourish? One reason is because they were not generated out of the relationship
between theory and practice Dewey describes, whereby theory “enlarges, releases and gives
significance to [practice]; while practice supplies theory with its materials and with the test
and check which keep it sincere and vital” (p. 36). This description of theory and practice
is so interactive -- theory and practice are so interrelated -- that it is hardly possible to
imagine a separation between the two. Dewey’s concept of theory is of a different order
from the modernist concept which privileges theory over, and separates it from, practice.
Viewing theory as superior to practice places theory on a meta level whereby theory easily
shifts from a set of principles about a particular phenomenon to a world view in which all
facts whatsoever are accounted for by using those same principles. Behaviorism is an
example; the stimulus-response theory expanded from an explanation of the salivation
behaviors of Pavlov’s dogs to an explanation of all human behavior. Without Dewey’s idea
of the test and check that practice supplies, behaviors that cannot be explained by the
stimulus-response theory are often dismissed or ignored by behaviorists. In a behavior
modification course I was required to take in my graduate counseling program, the
professor held a meta-behaviorist view. If a behavioral program did not result in expected
change, the program was assumed faulty. Likewise, if a behavior did not fit a stimulus-
response pattern, he faulted the observation of that behavior. Examination of the theory and
its universal application was rejected out of hand.

Dewey describes the theory of the “advanced schools” as in effect stating that what
is needed is for the teacher to surround students with interesting materials, supplies and so
on, and then remove him or herself from the context to allow the students the freedom to
respond according to their own desires. He says, “Now such a method is really stupid” (p.
37). And it is stupid for two reasons. One, it is not possible, and two, "it misconceives the conditions of independent thinking ... [because] there is no spontaneous germination in the mental life." (p. 37). He goes on to point out its inconsistency with the theory which generates it. If the theory were correctly applied, the teacher would not supply any materials because the selection and provision of materials by the teacher would "interfere" with personal freedom" (p. 37) of the student. Thus, by examining practice, "a test and check" is done on the theory. In this instance it is easy to recognize a problem with the theory. This method of examination can go the other way as well. The test of theory is whether and to what degree it is able to "enlarge, release and give significance" to practice. If being consistent with an educational theory does not even allow for the provision of materials, it can hardly "enlarge" anything.

Dewey's critique of traditional approaches to education portray the teacher as the sole "authority" who "dictates" and attempts to control all that occurs in the classroom. He links this authoritarian and controlling approach with what he believes modern experimental science has become -- an art and theory of control. He sums up the modern world view as one that marks a revolution in the whole spirit of life, in the entire attitude taken toward whatever is found in existence. When the things which exist around us, which we touch, see, hear and taste are regarded as interrogations for which an answer must be sought (and must be sought by means of deliberate introduction of changes till they are reshaped into something different), nature as it already exists ceases to be something which must be accepted and submitted to, endured or enjoyed, just as it is. It is now something to be modified, to be intentionally controlled. It is material to act upon so as to transform it into new objects which better answer our needs. (1929/1979, p. 100)
One afternoon in 1993, I was listening to a report on National Public Radio about a secondary school in the Northeast that was implementing a new marketing strategy. American businesses were finding it increasingly necessary to teach new employees basic math and reading, skills that had formerly been required before receiving a high school diploma. The school, interpreting itself as a "factory" that wanted to "produce" a "superior product" decided to 'cash in' on the situation. The decision was made that the best way to 'market' their products in order for the factory to have its 'highest possible yield' was to "guarantee" those products to the business community. The guarantee stated that "if the product is defective in any way and needs remediation in any subject, the factory would take it back and fix it at no cost to the business that employed said product." That is quite a guarantee, one most of us would no doubt like to have on items we purchase. However, as a description of students -- human beings as products of an educational factory, guaranteed and repairable if defective -- it is dehumanizing! Yet it fits Dewey's description of the theory of control marked by "a revolution in the whole spirit of life, in the entire attitude taken toward whatever is found in existence," (p. 100) flora or fauna, human and non-human animals alike. These are not conditions that insure growth into full potential, these are conditions that produce exactly the products of the machine metaphors used -- students who are viewed and view themselves mechanistically as products of a mechanized system. When the model is machine, then the human, the personal is not only irrelevant but something to be eliminated.

Such a mechanistic model is utterly incompatible with a theory of democracy, a concept founded in the notion of interdependence. Dewey summarizes his own theory of
democracy when he says, that “all social institutions have a meaning, a purpose. That purpose is to set free and to develop the capacities of human individuals without respect to race, sex, class or economic status. And this is all one with saying that the test of their value is the extent to which they educate every individual into the full stature of his [or her] possibility (1948/1957, p. 186). How does this happen? Through education because “education means the enterprise of supplying the conditions which insure growth, or adequacy of life” (1916/1966, p. 51)

What does it mean to engage in the enterprise of supplying the conditions which insure growth and enable every individual to develop his or her full potential? How does it differ from the factory model? Katherine Hayles says that “the world as humans experience it is a collaboration between reality and social construction. No longer simply what is there, reality is subject to constant revision, deconstruction, and reconstruction .... The postmodern milieu does not necessarily cause articulations ... [of new ideas and theories]. Rather, it creates a context in which they become thinkable thoughts” (Hayles, 1991, p. 14).

It is just such a milieu that Dewey desired. He sought a context where a new order of conceptions and a different direction of movement from the either/or pendulum of extremes would provide the means for educative experiences. “For we live not in a finished world, but in one which is going on” (Dewey, 1916/1966, p. 151). Just such an environment can be created through the use of metaphor where both/and thinking is explored and developed. It can also provide a context whereby theory and practice can be evaluated and understood in relation to one another.
What might all of this look like in practice? How does it apply to those preparing to teach, already teaching, and students in elementary through high school? What impact do the metaphors used for models of teaching and models for teachers have on those who teach? How is practice always tied to metaphors? What new metaphors are needed in theory and practice?

Ivor Goodson says that, "Life experiences and background are obviously key ingredients of the person that we are, of our sense of self. To the degree that we invest our 'self' in our teaching, experience and background therefore shape our practice" (1991, p. 144). I would go even further to say, that we can only teach out of who we are, and the level of investment simply becomes one aspect of who we are. Practice is always generated out of our own theoretical constructs. All teachers, all students have a philosophy of education by virtue of their experiences of education. This is so regardless of their level of awareness of a personal philosophy. Our actions in educational settings reflect our educational philosophy. Whitehead says that “the philosophic process ... should have received some attention from every educated mind” (1938, p. 3). One way to begin investigating our own philosophy is by examining our practice.

If our philosophy, theories, and the metaphors that shape our beliefs about the world are incongruent, our practice will be incongruent also. Continuity of experience helps develop congruence -- an agreement between what we do and what we think or believe. When there is a difference between our theories and our actions, cognitive dissonance develops. This is an internal conflict which occurs with incongruence. Cognitive dissonance can occur with the incongruence between our theories and actions. The dissonance caused
by the gap between our beliefs and actions is usually reduced by unconsciously altering thinking to conform to actions. However, "reducing dissonance without clearly examining the compromise it requires can lead people to abandon beliefs that are important to their self-esteem" (Green and Sanford, 1983, p. 394). A typical example is when a teacher looses his or her temper in the classroom. Yelling, screaming, or otherwise verbally abusing a student is never appropriate but happens often. For a competent teacher such behavior represents a gap between what the teacher does and what the teacher believes. However, this inappropriate behavior is often blamed on the students, or justified as being needed on occasion to teach the students exactly who is in charge. Such rationalizations reduce cognitive dissonance, but also compromise beliefs about the nature of the responsibility of the teacher to act in appropriate ways even when students do not. It is a shift from democracy to authoritarianism.

Cognitive dissonance can also arise with the presentation of ideas that are new. It can arise through the use of vehicles such as parables and metaphoric stories, that elude reduction to a single meaning. However, cognitive dissonance can also be an avenue for change and a way to deepen our understanding of ourselves. The dissonance arising from the presentation of new ideas can become fertile ground for cultivation rather than simply as place from which to escape by rejecting or ignoring the confusion of the new. The dissonance generated by the gap between our beliefs and practice can also alert us to the need to examine what we are doing. We are called to examine, carefully examine our theories and our practices. But this takes courage.
If we, in general, believe in democracy but are only able to act on that belief in instances when we feel confident, it is evident that we believe something different pertains when confidence is lacking. Even when we want to act democratically, if feelings of insecurity emerge, it is difficult to do so. And as Dewey says, “insecurity generates the quest for certainty,” (1929/1979, p. 254) a desire for control. Parker Palmer tells us, “When our fears as teachers mingle and multiply with the fears inside our students, teaching and learning become mechanical, manipulative, lifeless” (1990, p. 16). Feelings and emotions cannot be left unexamined any more than theories can. For “emotions in human affairs may easily, and regrettably, outweigh the influence of logical structures,” (Fernandez, 1986, p. 8). It is regrettable because emotions are difficult to control and are often even less closely examined than ideas. Fernandez also says that there is a “resistance to the study of metaphor [which] arises from the fact that metaphor has so much to do with feelings” (1986, p. 7). As one of my counselees recently said, “Metaphors are out of our control because we can neither predict nor control how others will interpret the metaphors we use.” And they sometimes take us places we do not wish to go. It takes courage to examine emotions and cope with the uncertainties of metaphor.

Since we teach out of who we are, our beliefs about the world, there is a recurring need to think about who we are, who we are becoming, what we are doing. Dewey says that “thinking ... is the intentional endeavor to discover specific connections between something which we do and the consequences which result, so that the two become continuous” (1916/1966, p. 145). Thinking, when applied to teaching or as an endeavor to understand

7 I am licensed by the State of Louisiana as a professional counselor.
ourselves, our feelings and actions, needs to be engaged at a reflective level whereby connections between our thinking and our doing lead to integration. “Good teaching cannot be equated with technique. It comes from the integrity of the teacher” (Palmer, 1990, p. 11). Integrity is the internal congruence, undividedness within, directing our activities in ways that promote growth. Integrity takes courage. C. S. Lewis says that, “Courage is not simply one of the virtues, but the form of every virtue at the testing point .... Honesty or mercy which yields to danger will be ... honest or merciful only on conditions. Pilate was merciful until it became risky” (1961 p. 137-138). Teaching is risky. It is risky in general; it is risky in particular. The import of every action is only a matter of degree. And teaching is no less an educative or miseducative experience for the teacher than it is for the student.

Whitehead says that “the use of philosophy is to maintain an active novelty of fundamental ideas illuminating the social systems. It reverses the slow descent of accepted thought towards the inactive commonplace” (1938, p. 237) whereby our ideas become routine, habituated and unexamined. But in order for our philosophy to be active and illuminating, we must think and reflect. The act of reflection is an act of responsibility because “reflection is the acceptance of ... responsibility for the future consequences which flow from present action” (Dewey, 1916/1966, p. 146). Philosophical reflection helps us discover and become who we are, which in turn allows us to make better informed choices in directing our future.

Where do we begin? We begin with metaphor. We do so in part because as Whitehead says, “Philosophy begins in wonder. And, at the end, when philosophie thought has done its best, the wonder remains” (1938, p. 232). Metaphors participate in wonder, not
certainty. This is perhaps better understood within the context that Dewey says thinking occurs. "Where there is reflection there is suspense. ... thinking is a process of inquiry, of looking into things, of investigation. ... It is seeking, a quest for something that is not at hand" (1916/1966, p. 148). We reflect to make connections, to gain knowledge for directing action and further inquiry not to find certainty because "all thinking involves a risk" (p. 148). Yet the willingness to risk is often in conflict with our desire for control. Reflecting, thinking, teaching all require courage. Courage is enlarged by integrity. And integrity is deepened through further reflection.

We begin with metaphor because theories are rooted in metaphor. To better understand ourselves, to gain insights into our philosophies, we begin by discerning the metaphors out of which they emerge. What do we mean when we speak of a classroom environment? In Chapter Five I only touched on the metaphors ecology and ecosystem. Sir Arthur George Tansely coined the term ecosystem to stress the concept of interdependence. "There is constant interchange ... within each system, not only between the organisms but between the organic and inorganic. These ecosystems, as we may call them, are of the most various kinds and sizes. They form one category of the multitudinous physical systems of the universe" (OED, 1987, p. 227). Each locale or habitat of plant or animal life is an ecosystem. Social systems can also be viewed as ecologies or ecosystems (Bateson, 1972; Berry, 1986). An understanding of the complexity of relationships constituting the social system of a classroom can be deepened through an ecological metaphor (Bowers and Flinders, 1990). Ecosystems are dynamic, the populations that constitute them are always in the process of change. Interdependence means that the growth and development of the
is connected to the growth and development of the members, which is connected to the
growth and development of the system as a whole. However, for growth to take place at
all these levels, i.e. the system as a whole fostering growth in individual members and
individuals fostering growth in one another and in the system as a whole, a basis of
cooperation is required. The cooperation is both for enlarging the significance of the whole
system and the enlarging of the individuals. Wendell Berry says that, “The definitive
relationships in the universe are ... not competitive but interdependent” (1986, p. 47).
Competition in the classroom is not totally eliminated, rather it is internalized so that the
participants compete with themselves rather than against one another. Cooperation with
rather than competition against can create a safe environment whereby the ecosystem
becomes a growth community -- another metaphor.

One of the difficulties of employing the ecology metaphor is in the nature of the
interrelationships, the interconnections that exist in a classroom. Some are visible, some are
not. It is like the Mandelbrot set, which the reader will recall is black. Everything inside the
set is black and all other colors are outside the set. Yet, when we zoom in on an edge, often
we see only a small speck of black, another fish, which seemed unconnected and completely
surrounded by colors. However, it is tied to the whole set, the original fish, by a thread so
fine that it is not visible even with tremendous degrees of magnification. We know, as in the
ecosystem system, that the connections are there for without them there would be no fish
beyond the first few magnifications. If, in the classroom, we ignore the connections, we will
see only a few static images and very little complexity.
Yet, because metaphors have so much to do with emotions, we must be cautious. As teachers, we are responsible for setting up an environment of growth. In order to help pre-service teachers, in what is usually their first undergraduate education course, understand their educational philosophies -- to find, choose and develop the metaphors that they want as guides -- I begin with a physical metaphor. I ask the students to change the linear arrangement of desks into a circle. It is simple, yet remarkably powerful. Student responses have sometimes been surprisingly strong but consistent with the notion of interdependence. Particularly in classes where none of the students have experienced circular seating, there is often resistance and discomfort with the change. Other classes are eager to break out of the rows where they looked at the back of heads instead of faces, never realizing a classroom could be a community. For a few students, this pattern is already familiar.

One class was uncomfortable with the circle, yet they did not want simply to return to traditional rows. They decided to divide the room into two sections facing each other, like a monastic choir. They said that this way they had less of a sense of vulnerability that the circle engendered and were able to see the faces of half their classmates. They openly engaged the emotions the circular pattern stirred and intentionally made a compromise that met their needs at the time. And one very small class of only twelve students (the others had thirty-five or more), completely resisted forming a circle. They isolated themselves among the mostly empty desks in the room, with few students sitting next to another, and stated flatly that they did not feel comfortable in a circle.
Reflection on the varied responses to what seems like an overly simple metaphor leads me to a metaphoric story told by the ancient Chinese philosopher Chuang Tzu and recounted by Thomas Merton (1963). The story goes like this: Once a seabird was blown inshore and landed outside the capital of Lu. The Prince ordered a splendid reception with wine and beef. He ordered musicians to play. But dazed with symphonies, the unhappy seabird died of despair. Chuang Tzu asks, “How should you treat a bird? As yourself or as a bird? Ought not a bird to nest in deep woodland or fly over meadow and marsh? Ought it not to swim on river and pond, feed on eels and fish, fly in formation with other waterfowl, and rest in the reeds? Bad enough for a sea bird to be surrounded by men and frightened by their voices! That was not enough! They killed it with music! ... Water is for fish and air for men. Natures differ, and needs with them. Hence the wise men of old did not lay down one measure for all” (Merton, 1963, p. 103-104).

What constitutes one measure for all? Must students sit in a circle to learn new ways of thinking? How can I take each student’s nature into account? The research of Brophy and Good echoes “the wise men of old” in their discovery that “what constitutes effective instruction ... varies with context. What appears to be just the right amount of demandingness (or structuring of content, or praise, etc.) for one class might be too much for a second class but not enough for a third class (1986, p. 370) and it varies even within a class as subject, group size, and specific objectives change.

There are no simple answers. I think; I reflect; I move to the next metaphor. Usually by the fourth day of class, the students are experiencing varying degrees of confusion, in
part because my approach is non-linear and for most students this represents a change. I have the students break into small groups and generate a metaphor that expresses their feelings about being in this class. I tell them, that I am aware that students often find this class different from what they had expected and whatever they are experiencing is okay. They are asked not to generate "flattering" metaphors to please me but ones that convey for them, their own experiences. All the classes have responded well to this process. At this point in the course, they seem relieved to be able to express to one another what they are experiencing and excited by the discovery that other students share their confusion.

Generating a metaphor to describe their experience can do several things. Because they are engaging in the communal generation of metaphors, a sense of community emerges. It is communal because it is about their common experience not simply a group activity. It also helps develop a safer context for later explorations of themselves and new ideas, because that is the very process in which they are engaged. It is safe because all the students share in a sense of discomfort to some degree.

The metaphors the students generate tend to be repeated in each new class. Most of them focus on a sense of confusion or frustration. The most frequent metaphor is being in a foreign country and not knowing the language. This metaphor exposes a communication problem. However, the country is recognized as foreign, not alien, and learning a language is part of their educational experience. They say this as a metaphor with expectations for

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8 A student, in the small class that would not sit in a circle, complained to me that she was accustomed to going to class, taking lecture notes, and being told what to study for the test and that that was the way she liked it. She assured me that no teacher in the past had ever asked her to think.
success. Another recurring metaphor is a tunnel with a light seen at the end. Again there is expectation of success though the territory may not be as pleasant. Other groups see themselves in a maze. They hope, but are not always sure, they will find a way out. Some of these students talk about frustration as well as confusion. And one group likened the class to learning to swim. These students had all accomplished that goal and still remembered the struggles and difficulties they encountered. They seemed to exhibit the greatest confidence in success by linking the present challenge with a past achievement.

Once the metaphors are generated, each group shares their metaphors with the rest of the class. They discuss their thoughts and ideas about their own metaphor and those of others. I assure them that their discomfort is a natural part of the process. Indeed their confusion can be viewed as evidence of participation in thinking in new ways. This provides relief to concerned students who primarily connect confusion with inattention and/or lack of participation. It also affords an easy entry into the investigation of thought processes such as Piaget's concept of disequilibrium (1977) and Dewey's ideas on reflection because the students now have conscious, lived experience with which to connect these ideas. The ideas and experiences of metaphors and reflective thinking lead into the development of the student's own metaphors for their own ideas about teaching.

It is a natural transition to move from metaphor to narrative. "To talk of metaphor is to talk of tropes .... Tropes always define a relationship between terms. Tropes are about relationships, never about a term taken by itself" (Sapir, 1977, p. 3). Metaphors establish a certain kind of relationship and narrative can relate the form of action the relationships take. Rosen says that "to tell a story is to formulate an interlocking set of meanings, to listen
Rosen's point brings out the recursive nature of narrative.

Richard Hopkins in his Preface to *Narrative Schooling*, says that narrative relates to the essential concerns of education -- "words, representations, ideas, forms, structures, quantities, qualities, and judgments. It is, among other things, an exercise in critical thinking. Our narratives are the means through which we imagine ourselves into the persons we become" (1994, p. xvii, emphasis added). What could be more important for the process of becoming a teacher; what could be more important for our students? Hopkins suggests narrative as a new root metaphor for American education. This is a root metaphor with possibilities for changing, re-framing our entire understanding of the educational process by reinterpreting our understanding of ourselves. As long as the machine metaphor undergirds the educational structure, education will be about *what* rather than *who* students and teachers are. The implication is clear when Hannah Arendt (1959) says that when we know someone's story, we know who they are or were. Without the story, we only know *what* and it is the *who* that makes us human. Frankl bemoans the loss attendant to our change in interpretation. He says, "man, as long as he regarded himself as a creature, interpreted his existence in the image of God, his creator [with infinite possibility]; but as soon as he started considering himself as a creator, began to interpret his existence merely in the image of his own creation, the machine" (1988, p. 16).

Finally, narrative leads us to the concept of framing and re-framing, the idea of how we conceptualize any event, situation or context -- our interpretations and re-interpretations,
our constructions and reconstructions. The metaphors we use in our narratives tell us how we view a situation. Our frames exhibit our theories. If we use battle-field terminology when we describe a classroom experience, we are using war as a frame. Donald Schon has described this idea for over a decade and across many disciplines (1983, 1987, 1991; Schon and Rein, 1994). One comparison of frames he uses comes out of views of urban housing from the 1950s. One story calls it blight and the other a natural community. He says that “these are powerful stories, powerful in the sense that they have shaped public consciousness about the issues of housing. Each story conveys a very different view of reality, and represents a special way of seeing” (1993, p. 146). Through what he calls generative metaphors, “each story constructs a view of social reality through ... naming and framing” which is like Dewey’s idea of problem-setting (1938). By naming the condition “urban blight”, a disease metaphor is invoked whereby a cure is called for. The other story calls the same area a “natural community” evoking human relationships as a metaphoric basis where preservation becomes important. Bowers reminds us of the “power of language to enforce conceptual habits, even when the conceptual habits are contradicted by the force of everyday experience” (1987, p. 75).

How can we re-frame the educational process? How do we understand and deal with the concept of the interplay of law and determinism generating life? Dewey talks about it this way:

Contingency is a necessary although not ... a sufficient condition of freedom. In a world which was completely tight and exact in all its constituents, there would be no room for freedom. Contingency while it gives room for freedom does not fill that room. Freedom is an actuality when the recognition of relations, the stable element, is combined with the uncertain
element, in the knowledge which makes foresight possible and secures intentional preparation for probable consequences. We are free in the degree in which we act knowing what we are about. (1929/1979, p. 249-250)

How can we reconstruct educational experience? What metaphors can we intentionally choose to re-form our conceptual habits? What is there to do so we may believe in schools as places for the encouragement of growth and limitless possibilities, rather than as factories that replicate machines? We must be willing to think, but “all thinking involves risk” (Dewey, 1916/1966, p. 148). Do we have the courage to return to the roots of philosophy -- personal philosophy, educational philosophy -- which Dewey says is a return “to the old saying that philosophy is love of wisdom, of wisdom which is not knowledge and which nevertheless cannot be without knowledge” (1929/1958, p. 409)?
CHAPTER SEVEN

BOTH/AND

The evils which we suffer in education ... the whole separation of knowledge and practice--all testify to the necessity of seeing mind-body as an integral whole.... When we take the standpoint of action we may still treat some functions as primarily physical and others as primarily mental.... Yet if we are wise we shall not regard the difference as other than one of degree and emphasis. (Dewey, 1931, p. 302-302)

This concluding chapter unites specific examples of educational practice with the ideas and concepts explored throughout the preceding chapters. The illustrations come from several sources including the experiences of other teachers as well as my own. The examples will be connected to specific key ideas previously presented, often using previous quotations as threads of continuity. A careful reading will reveal that the headings I use to emphasize particular concepts could be used interchangeably for almost all examples. In other words, because of the nature of the non-dualistic approach, there is a recursive, interconnected, self-similar aspect whereby the examples could be used under almost any of the headings. I use headings to focus on a particular idea and to draw the reader’s attention to the interrelationships among the examples.

NON-DUALISM, OR BEYOND EITHER/OR THINKING

In the Introduction, I stated that non-dualism was the cornerstone of the world view that forms the foundation of this dissertation. How does one help students experience non-dualistic ways of thinking they have not yet encountered or thought about? In linear, modernist methodology, one would simply tell them directly. However, when one wants students to understand the importance of the indirect, other methods are needed; they must
experience in order to have “knowledge of” rather than just “knowledge about” (Spinoza, 1670/1985). A linear method would effectively nullify the very thing being taught -- the indirect, the non-linear.

The narrative and indeterminate or paradoxical thread of Oriental origin that entered Western thought through Christianity’s Judaic roots has been hidden from view through much of Occidental history. Here again, by paradox I mean the concept of holding opposites in tension rather than viewing them as contradictory. One way to re-weave that thread is through the use of Eastern stories exemplifying those concepts.

There is an ancient Chinese story about an old farmer whose only horse ran away. His neighbor came to console him saying, “Bad luck.” But the old man merely replied, “Who can say what is good luck or bad?”

The next day the farmer’s horse returned, bringing ten wild horses with it. The neighbor came by to congratulate the farmer for his good luck. The farmer again replied, “Who can say what is good or bad?”

On the third day, the farmer’s son mounted one of the wild horses to break it. Instead, he was thrown and his leg was broken. Upon hearing of the son’s accident, the neighbor came to share in the farmer’s sadness. But again the farmer asked, “Who knows what is good or bad?”

On the fourth day, the army came through the area conscripting all the young men into military service. Upon seeing the son’s broken leg, they exempted him. The neighbor, hearing the news, wanted to share in the gladness. But the farmer, in his consistent wisdom, again replied, “Who can say what is good or bad?”
I have used this story with high school students as a means by which to introduce both/and thinking and to help expand their ability to reflect. In preparation, the students engage in reflective thinking through the process of weekly journal entries in which they reflect on experiences that are meaningful for them. After telling the story, I ask them to comment on it. Some students say, “It’s a stupid story; of course we can know if something is good or bad. The horse running away was bad and its coming back with more was good.” Other students see more to the story. Some reflect extensively on it, saying that it resonates on a deeper level for them. “Partial conclusions emerge during the course of reflection” (Dewey, 1933/1971, p. 75). The reflective students make comments such as, “Well, it’s not just good luck or bad luck. It’s how you look at it. And there’s more than one way to see it.” Others say, “It’s like the events all sort of flow together. You can’t really say that it’s good or bad until the next thing happens, and then you can’t say it’s either … and it gets kind of confused.” Partial conclusions begin to emerge. The idea that understanding things in simple either/or terms begins to blur. Some students connect easily with this story, some don’t like it, others just feel confused. The discussion comes from thoughts and ideas generated by the students; I give no explanation. But all have been presented with an alternative way of understanding. Is it educative for all of them? Is anything educative for all? Who can say?

One student was particularly struck by the sense of freedom he experienced in thinking about the story. He said he felt free to see things no longer as just good or bad. He also came to an understanding of how important context is. That the story had a lasting impact was made evident throughout the year as this student, from time to time, would
recognize paradoxical elements in something occurring in class and interject, “Who can say?” as a way to draw us back to the ideas we struggled with in that story.

This story serves as a metaphor as well. It isn’t just a story about the man and his neighbor. In its complex simplicity, it functions as a metaphor in Vaught’s terms, “an intersection of indeterminacy and determination” (1987, p. 228).

A second example that relates both to the concept of non-dualism and metaphor is connected to ideas in Chapter Three. There we saw that the ideas of Descartes, Bacon and Newton led to major changes in scientific thought. Dewey says this became a reversal of the “methods of the ancients [who based] their conclusions about knowledge on the nature of universe in which knowledge occurs” (1929, p. 41). The new method was to “arrive at theories regarding the nature of the universe by means of theories regarding the nature of knowledge” (p. 41). But knowledge, like mind has become “a separate, isolated quality, removed form the experiences and wisdom of life” (Doll, 1993, p. 113). With the separation of knowledge from life experience, a gap slowly opened between lived experience and nature. Today this gap is a chasm so wide that the equation of humans with machines is taken for granted.

Students live in a world dominated by more and more complex and sophisticated machines. In an effort to help students connect their own experiences to the natural physical universe in which we all live, rather than remaining in the technological realm where they spend so much of their time, I had them write a story. I brought a basket of small rocks to class and spoke briefly about the formation of rocks and how old these rocks must be. I recounted that according to the Big Bang theory, all matter in the universe comes from a
class and spoke briefly about the formation of rocks and how old these rocks must be. I recounted that according to the Big Bang theory, all matter in the universe comes from a common source; therefore, we are, in some way, related to the entire physical universe (Swimme and Berry, 1992).

Next, I said that each rock had its own story. Each had each existed somewhere for thousands of years, before ending up in that basket. What story did each rock have to tell? I selected several rocks and told partial stories, usually based on some physical characteristic of the rock that suggested itself to me. The students then selected a rock from the basket and were asked to listen to the rock’s story and write it down.

The responses or reactions to the assignment were as varied as the students. One senior, who was very literal minded, said the assignment was “The stupidest thing I ever heard.” I agreed that the assignment was unusual, but surely the rock must have a history. Where could it have come from? What had it seen or done during all those centuries? What could she imagine about it? She wrote a very good story that revealed quite a lot about herself. All the stories were, of course, really about the students themselves in some way. Each ‘rock story’ was a metaphor for some aspect of their life -- an interest, a concern, an attitude about something, some strong emotion. It served to connect them with a larger physical world as well as aspects of themselves. Even though they did not completely understand, they were intrigued with what they experienced. On the following day, students who had been absent found out about the stories from their friends and came to me to get a rock so they too could write a story. Never had I had high school students insist upon
making up work they missed. They knew about what had occurred and they wanted to experience what it was.

A final example of getting beyond either/or thinking has to do with the concept of viewing something as either a success or a failure. Students, no less than teachers view grades as marks of success or failure. As teachers, we tend to grade our actions in the classroom as either pass or fail. Non-dualistic thinking opens up the possibility for us to do what Frankl suggests and “turn the negative into something positive, tragedy into a triumph, a predicament into an achievement on the human level” (1988, p. 137). Reflecting on one of my first teaching experiences allowed me to do just that. An experience that could have been viewed only as a failure and thereby remained one, was reconstructed as an educative experience for me.

Our attitudes are intimately connected to our emotional state. We have a general life attitude, but that attitude can be disrupted by everyday events. Whatever our attitude is at the moment is the one we take into the classroom. As addressed in Chapter Five, insecurity can impact our attitude.

My first formal teaching experience was as a graduate student in Marriage and Family Counseling. I was in my mid-thirties and very eager to be helpful. The course I taught was basic academic skills to under-prepared freshmen. Under-prepared meant that their ACT composite score was below 15. These students were considered under motivated and poorly prepared for college level work. I taught two sections of this course.

The first week went well. I developed a good rapport with the students, particularly the Monday/Wednesday/Friday section. However, during the second week something
unexpected happened. I prepared a lecture on motivation. This was an important topic for under motivated students and would be quite good for them. I walked across campus to my Wednesday class prepared to give them just what they needed.

The class began as usual -- roll, a little conversation, notebooks and pens out for the lecture. However, about ten minutes into the lecture, I noticed a change in the students but didn’t quite know what it was. I continued the lecture. After twenty minutes, their reaction had become palpable; I could almost hear their minds slamming shut. I hurriedly concluded the lecture and dismissed class ten minutes early. I felt devastated! And I didn’t know why.

As I walked across campus to my office, I reflected on what had happened. Had I simply imagined a change? No, the reaction was virtually unanimous. Even the most attentive students has closed themselves. I could blame the students if it had only been a few, or even half. No, the problem was not the students. Then surely it was the lecture. No, closer examination showed the lecture to be adequate. What then was the problem? At this point, I asked myself, “What had I hoped to accomplish and how I had expected to do so?” I was horrified with my answer. My reflection revealed that I had taken an attitude that was incongruent with my beliefs. In my attempt to ignore my insecurity of being a new teacher, I adopted a desire for certainty, control. I decided for the students exactly what they needed to know and they were going to get it whether they wanted it or not. I would open their minds and pour it in. Thankfully, their response was a resounding NO!

Fortunately, I had the Thursday section the following day. I decided to present the same lecture with a changed attitude. I still believed that the ideas in the lecture were important for them, but realized that I had no right to impose that belief. My responsibility
as a teacher was to offer material I thought important and allow them to choose their own
responses. Indeed, they would make their own choice anyway, but if I imposed my will, then
they had something else to deal with, something beyond the subject at hand. In other words,
my attitude could be a miseducative side-track for them. The Thursday section responded
quite differently. Some students were very attentive, others moderately so, and a few, as
usual, seemed completely disinterested. They were clearly making choices about the lecture
rather than an attitude being imposed upon them.

NON-LINEAR

In his syndicated comic strip “The Family Circus,” Bill Keane created a metaphor
representing linear, modernist education (July 9, 1995). The strip is not deeply profound,
simply a mirror of common experience, a part of the pictorial narrative tapestry of American
life. This particular cartoon consists of a single frame drawing of a park bisected by a paved
path. The two central characters are Billy, a first grader, and his grandmother. They are both
standing in the foreground at the end of the path. Behind them are dotted lines that indicate
the way each traveled from the entrance to arrive at the same spot. The grandmother’s bold
dotted line is straight. Billy’s smaller dotted line encounters nearly everyone and everything
in the park. He climbed trees, examined objects, spoke to and played with people and
animals; his crossing of the space between the gate and the end of the path reveals quite a
different experience from that of his grandmother. The grandmother, with one arm out in
admonition says, “I walked straight from the gate to here, Billy, but you wandered all over
the place. Now what does that teach you?” Billy replies, “Not to miss out on all the best
things!" That is hardly the lesson the grandmother, a metaphor for modernist, linear teaching, wanted Billy to learn.

Dewey's notion of life as an educational process, evidenced by both the grandmother’s question and Billy’s reply, considers every happening in life as a learning experience of some kind. Had their outing been a geometry class, the grandmother’s demonstration of the shortest distance between two points as a straight line, would have been appropriate. However, Billy, understanding the educational context as a park, embraced the sundry experiences available.

Dewey says, "Perhaps the greatest of all pedagogical fallacies is the notion that a person learns only the particular thing he is studying at the time" (1938/1963, p. 48). I turn to another grandmother as a more suitable model of teaching. A friend recounted a story from her childhood. Her grandmother was unraveling tangled embroidery thread and asked Carol to help. Carol protested, saying the thread only cost a few cents per skein so it should be thrown away and more purchased. Her grandmother's reply was, “How then, will you learn patience?” How indeed? What concepts do we fail to learn in a disposable, linear society where direct methods are privileged? What are the “best things” Billy did not want to miss out on?

Many important aspects of life, for instance patience and wisdom, are learned indirectly, as by-products of other activities. Dependence on direct methods alone is like embroidering our history across a piece of cloth. Embroidery stitches a picture on the surface of existing fabric. Tapestry, on the other hand, is both an indirect and integrated process. It is indirect by being woven from the back and integrated inasmuch as the picture
and the fabric are one. Education as an aspect of our life tapestry should be examined both from the back where it is woven and from the front where the picture is revealed -- not exclusively one or the other.

Another, more direct example of the educational fallacy noted by Dewey was experienced by some of my students who were pre-service teachers. They spent an hour each week during the semester observing an elementary classroom and reported on their experiences. During a class discussion on their observations, several students who had watched the same fourth grade class, mentioned the teacher's primary method of discipline. She turned off the lights when the students became noisy, waited until they were quiet, then resumed the lesson. When the noise level rose again, she repeated the process. During the forty minutes the students observed, the teacher repeated the process numerous times. At the beginning of our debriefing, when asked what they thought the students had learned, the pre-service teachers gave standard comments about the English lesson. However, after discussing the observation in greater detail, they concluded that perhaps what the students had learned most thoroughly was how many times they could get the teacher to turn the lights on and off -- or, how to manipulate authority figures.

As seen in Chapter Five, one aspect of the non-linear is the element of unpredictability; answers are generated by participation in the process, not in advance. The Mandelbrot set is produced by solving a simple equation and then using the answer as the next value for X to solve it again. It is only by solving the equation again that the next value of X is known. It cannot be predicted in advance. The pre-service teachers had originally applied a linear formula, something Dewey says is a great pedagogical fallacy, by assuming
that what was primarily being learned was the subject being taught. However, through participating in discussion and reflection on various aspects of what they observed, the pre-service teachers discovered something both unexpected and unpredictable.

**METAPHORS**

Chapters Three, Four and Five treated metaphor in various ways. Metaphors can be fairly simple or direct when used primarily to explain a single concept. However, what Gadamer (1989) calls the “metaphoricity of language” is a more complex notion. Inherent in the concept of the metaphoricity of language is the way metaphor goes beyond either/or thinking. Metaphors cannot be reduced to either one thing or another and continue as metaphors. We saw this with the machine metaphor for humans. When reduced to an equation, an identity -- the human machine -- machine loses its metaphoricity. Metaphors are also non-linear in that all the possible connections that someone might make cannot be predicted. This is especially true with more complex metaphors, particularly metaphoric stories and parables. With re-readings and additional reflections, the story can generate new connections, further possibilities in the same reader.

A lower school religion teacher wanted to talk to the fifth grade about the use of inappropriate language. He had in mind primarily words considered profane or obscene. The metaphor he generated to help the students understand the concept of why such words were inappropriate was “word litter.” He began by asking the group, “What is litter?” Their ideas began with trash on the side of the road and expanded to encompass everything that harmed the environment. They ended with toxic waste. After the students explained their ideas, the teacher asked them, “What do you think ‘word litter’ would be?” Immediately they made
the connection. These fifth graders notice litter and detest it. Their responses were exciting. The students asserted that word litter would include “dirty” words, “swear” words, and “curse” words because they make the social environment ugly like litter defaces the physical environment. One student said that it would also include name calling and other kinds of hurtful words. Then connections were made between the harming of the environment and the harming of others. They maintained that some words are toxic inasmuch as they hurt people as badly as toxic waste hurts the environment. Not only did the students understand the metaphor the teacher used, they generated another metaphor that nuanced greater degrees of consequences.

Why did this metaphor work so well? Dewey says “the work of projecting hypotheses for the education and conduct of mind, individual and social, is subjected to the test by the way in which the ideas it propounds work out in practice” (1910, p. 18). My hypothesis here is metaphors have strong educational implications; they are essential in bridging the gap between the familiar and the unfamiliar. Dewey also maintains that the educational task which continually confronts us is “to establish working connections between old and new subject-matters. We cannot lay hold of the new, we cannot even keep it before our minds, much less understand it, save by the use of ideas and knowledge we already posses” (1929/1958, p. vii-ix). Donald Oliver, in making a "distinction between grounded knowing and technical knowing," (1990, p. 64) addresses the significance of the gap using different language. Technical knowing is simply having facts about something, whereas, grounded knowing, what Dewey means by understanding, connects experience with those facts. Eventually, if all we possess is technical knowing, the gap will emerge. This
will be followed by gaps in our practices. For instance, if we lack grounded knowledge, occasions will arise when we do not know how or where to apply the technical knowledge. Children who are only told that some words are “bad,” but lack an understanding of why, also lack the knowledge of when, if ever, it is appropriate to use them. This concept is equally true for broadening and/or deepening subject-matters. If all we have is a list of “bad” words, without a grounded understanding of the consequences of using those words, we have no way of including any additional words to the list.

Dewey says that “the greater the gap, the greater the disparity between what has become a familiar possession and the traits presented in new subject-matter, the greater is the burden imposed upon reflection; the distance between old and new is the measure of the range and depth of the thought required” (1929/1958, p. ix). By beginning with the familiar concept of litter before moving to the new ideas connected with the metaphor “word litter” the teacher made sure the gap was not too wide. Evidence of the students’ reflection is the additional metaphor they generated -- toxic waste. The range and depth of thoughts and connections that were involved in the process can be uncovered upon examination. Through the use of metaphor to connect old idea with new ones, the students easily bridged what could have been an enormous gap between litter and hurt feelings. The metaphor also allowed for the transition from technical knowing to grounded knowing. Telling students that certain words are inappropriate is “technical”; their telling the teacher why some words are toxic is “grounded” in their own experiences. They are now prepared to specify both which words they consider “litter” or “toxic” and the contexts in which such designations applies. A further example of the children’s deepened understanding occurred when students
explained the use of the word “hell.” They indicated that it was appropriate to use “hell” in theological discussions but not appropriate when used to curse someone.

At an international conference on curriculum theory and classroom practice in the fall of 1995, there were a number of presentations dealing with metaphor. I will discuss two of the sessions I attended. The first was the result of a graduate class assignment. The students were either practicing teachers or administrators. Their assignment was to write a paper using a metaphor to express their ideas for curriculum change. Four of the students presented their papers in the session.

Eric Snead uses the automobile as his metaphor because he is interested in cars. His paper, “A Developing Curriculum: The Jaguar and the Chevette” connects his ideas about those two very different types of automobiles and different kinds of curricula. The major thrust of his argument is that Chevettes are cars that are mass produced for utilitarian purposes and Jaguars are crafted by and for those who truly appreciate fine quality. He sees the educational process like the production of Chevettes. He says, “Like the assembly of a Chevrolet, the child’s experience in my school is filled with quality control checks.... We seem so worried that our students will not meet our minimum standards that we concentrate all of our energy on measuring that minimum performance ... [in order] to produce a budget minded, middle class, average performing product” (Snead, 1995, p. 1-2). He continues to develop his metaphor by comparing the persistent use of the scientific management methods of the Tyler Rationale that make the educational process like an assembly line.

His comparisons to the building of the Jaguar are suitable as well, but this is where a deeper understanding of the use of metaphor is needed. The Jaguar is an automobile
crafted with care and special attention, a product that is expected to demonstrate superior performance on the road. However, it is still a machine. Comparing and contrasting different production methods of automobiles is an excellent metaphor for describing the curriculum as it is. But the changes Snead envisions, ones emerging during discussion of his paper, are not mechanistic. However, by using the same root metaphor for how things are and how he wants them to be, Snead is tied to working with the same order of concepts. To move beyond mechanistic curricula, one must also move beyond mechanistic metaphors. Dewey's call for, "a new order of conceptions leading to new modes of practice" (1938/1963, p. 5) can also be understood as a call for new metaphors to express these new order concepts. This is a call that is just as commonly ignored or misunderstood today as it was in 1938. William Glasser runs into this same problem with his proposals for educational change in *The Quality School* (1990). He advocates a move from boss-management to lead-management. Glasser and Snead both end up proposing changes that are simply a matter of degree. The Jaguar may be special, more carefully crafted than the Chevette, but is an automobile nonetheless. A benevolent dictator may be preferable to, but is no less a dictator than is a tyrannical one; it is merely a matter of degree, not kind.

Non-mechanistic metaphors of living systems, such as ecology, immediately shift the nature of relationships among the curriculum, the student, and the teacher to ones in which everything exists inside the same system. This conceptual shift is from a closed, mechanistic system to an open, living system. Mechanistic models are based on closed systems because machines are closed systems. In mechanistic models, the teacher (or manager) is outside the system of the students and so is the curriculum. This parallels the fact that workers are not
part of the products they produce. In other words, workers assemble automobiles, but the automobiles do not assemble the workers. It is not a reciprocal relationship. On the other hand, understanding the classroom as an eco-system recognizes that all parts of the system influence and modify each other. The teacher affects and is affected by the students; the students are affected by and affect each other and the teacher. In some way, all change and are changed by everything that occurs. This even includes the curriculum.

The second session I attended on metaphor was conducted by a professor who regularly has his students generate a metaphor expressing who they perceive themselves to be as teachers. He uses this exercise with graduate students who are teaching, as well as undergraduate, pre-service teachers. A major portion of his presentation was having those in attendance participate in this same exercise.

He issued a sheet with questions for reflection about our approach to teaching -- our mission, intentions, use of authority in the classroom, relationship with students -- to help begin the process of reflecting on our personal theory and practices. In addition, he gave out a list of over a hundred names of well known people and characters from history, fiction, fantasy, sports and other areas. We were asked to select one or two of the names that best fit who we see ourselves to be as teachers and be prepared to share the metaphor with others.

Because I use metaphors often and am interested in the way others use them, I found the exercise helpful. It was helpful in reflections about my teaching practices as well as my perceptions about myself as a teacher. I gained new insights and I found ideas to build upon for future teaching experiences. In Chapter Six, I described an exercise I use with students
in which they break into small groups to generate a metaphor to describe their experience of being in my class. One of the benefits of this approach is that the indirectness of metaphor helps the students feel less vulnerable while at the same time enabling them to explore their experience at greater depth. The task of generating a metaphor for oneself as a teacher uses the same principles. Whenever we explore personal perceptions, the need to proceed at a safe distance is important. A sense of safety is easier to attain when the metaphor is a well-known person or character. Their fame indicates their characteristics are publicly known and so shared by the other participants. When I choose a public character, others know that I am saying certain things about myself indirectly. The fact that others share an understanding of that person’s characteristics can help them to assist with my process of reflection. Through discussion of characteristics of my metaphor, similarities and differences between myself and my metaphorical person emerge. By looking at the famous person directly and myself indirectly, I don’t feel defensive. I am free to accept or reject any characteristics associated with my metaphoric character without having to justify or explain more than I want. In the session, this became a reciprocal process whereby we each gained insights into our concepts of ourselves as teachers and, through sharing, helped others in their reflection. It was a communal activity.

This exercise served as the beginning of the reflective process of coming to understand oneself as a teacher. The metaphors lead to stories about teaching experiences -- one’s own teaching and teachers from the past who had made an impression, for good or ill, on the storyteller. Possibilities for future activities to expand and deepen the development of self and others as teacher could proceed from this beginning. By moving from metaphor
and narrative to fact and logic, one could closely examine the stories and the examples they contain. Reflection and examination can bring to light consistencies and inconsistencies between the metaphor and the attendant characteristics we want to embrace. Further inquiry can help us understand the theory behind our metaphors. We can then ask if that theory is working in practice. Thus we weave and interweave various modes of thought in and out for deeper understanding, richer meaning, and greater accuracy.

The reconstruction of philosophy, of education, and of social ideals and methods go hand in hand.... Practical changes cannot take place without demanding an educational reformation to meet them, and without leading [us] to ask what ideas and ideals are implicit in these social changes, and what revisions they require of the ideas and ideals which are inherited from older and unlike cultures. (Dewey, 1916/1966, p. 331)

The weaving of our life tapestry as an integrated whole means understanding individuals as distinct, unique members of communities. It means reconstructing the past and integrating it into the present to point toward future possibilities for growth. Both/and thinking, non-linearity, and metaphor are concepts and means by which to reconstruct educational experience. Life, education, democracy, community, becoming fully human are all part of the reconstructive process. Through metaphors and narratives we gain insights and uncover meaning in our own stories and those of others so that we and they may become increasingly human. By reflecting on metaphors, stories, and other experiences, by using facts and logic, we can examine carefully and precisely the world in which we live. As we gain greater insights into how to further reconstruct our lives -- to better weave our tapestry without discontinuities and splits -- we will also be able to weave strength and integrity for ourselves and the society in which we live.
REFERENCES


VITA

Jeanne Robertson was born Jeanne Edwards on October 3, 1947. At the age of eighteen and after one year of college, she married Edward R. Robertson, Jr. When their two children reached adolescence, she returned to college, earning a B.S. in 1984 and an M.A. in Marriage and Family Counseling in 1986. She received her LPC license in 1989. She has been employed as a counselor and/or teacher ever since. Her counseling specialty is chemical dependency and a primary educational interest is philosophy. These readily intertwine in the issue of either/or thinking which dominates both chemical dependency and modernist education. Jeanne and her husband Ed reside in New Orleans.
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