

**CULTURAL TRANSFORMATION: HISTORICAL
PERSPECTIVE AND ITS IMPLICATIONS
FOR CURRICULUM THEORY**

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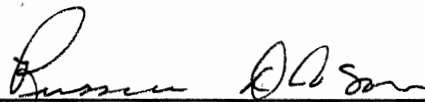
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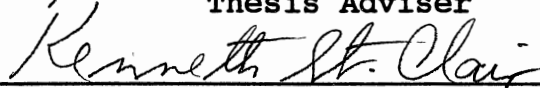
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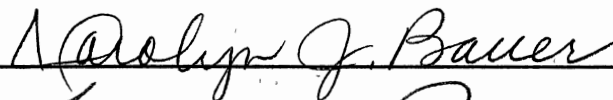
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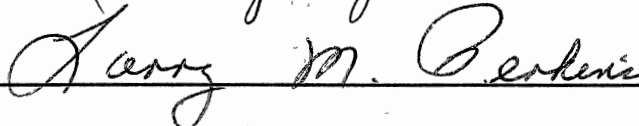
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CHAPTER I

A CHANGING WORLD VIEW

Many curriculum workers have recently become concerned with changing cultural patterns in America. Some curriculum workers have maintained that America, and indeed the world, are in the midst of profound cultural changes. Taken collectively, these changes are referred to as cultural transformation.

Culture is usually defined as the totality of our socially transmitted behavior. These would include all behavior patterns, arts, beliefs and institutions--in short, all aspects of human behavior. To deal with cultural transformation, some curriculum workers have speculated that new modes of thought are needed. These modes of thought, or paradigms as they are often called, constitute our outlook on the world. Paradigms of thought constitute how we view the world (Kuhn, 1970). Paradigms become the filters by which we perceive reality.

Capra (1982) states that the changes the world is undergoing are so profound as to constitute a paradigmatic shift. This shift would represent a change in conventional thinking. Such changes, according to

Capra, will create a worldwide crisis. As an introduction to his book, The Turning Point (1982), Capra states:

The new concepts in physics have brought about a profound change in our world view; from the mechanistic conception of Descartes and Newton to a holistic and ecological view, a view which I have found to be similar to the views of mystics of all ages and traditions. (p. 15)

By placing his thesis squarely on the shoulders of the "new science", Capra has given us a method by which to examine the emerging world view he speaks of. "New Science" refers to the emerging metaphor of quantum physics. Thomas Kuhn (1970) explored the meaning of paradigms as they applied to scientific thought. In this study the terms paradigm and world view are to be used interchangeably.

Paradigm shifts are not easy to describe or to classify. Thomas Kuhn (1970), in his book The Structure of Scientific Revolutions, states that scientific revolutions are often invisible to those participating in them. Kuhn (1977) also points out that emerging paradigms often develop and exist side by side with the dominate (existing) paradigm. Taken metaphorically, this conception of transformation (paradigm shift) may help to explain the rise in interest in transformational theory.

We sense, perhaps innately, that change is taking place. We are, however, often unable to articulate exactly what these changes represent.

Kuhn (1970) seems to warn us against the expectations of rapid change. Americans, particularly, always seem to want immediate answers. Kuhn's position clearly is that change, while very real and substantial, may not be apparent to all. Kuhn was speaking of scientific paradigm shifts. However, this view of how scientific transformation takes place has led many to draw upon Kuhn's work when describing other aspects of our changing world.

There is ample evidence to suggest that Western culture is indeed undergoing tremendous change. Sociologists are not necessary to inform us of the breakdown of the American family, the proliferation of the drug culture, rising crime rates and general disenchantment with modern society. I contend that these changes are significant enough to represent a paradigm shift along the lines discussed by Thomas Kuhn.

A shift in cultural norms poses serious questions to curriculum workers. How do we keep up with such momentous change? How can curriculum be constructed as to have meaning and value? What are the implications of cultural transformation on our own personal belief systems?

Knowledge which is limited and fragmented is not likely to have value. Increasingly, the language of today seems to be failing to deal with our world crisis. Personally, I have come to believe that the language base upon which the field of curriculum is based is too limited for today's changing culture.

Modern curriculum has been constructed on a paradigm grounded in Newtonian science. The Newtonian paradigm has emphasized linear and mechanical approaches to education. The Newtonian view of man as a machine has tended to alienate large segments of society. Spirituality and intuition are no longer acceptable, since they do not represent verifiable entities. What is needed is a new vision of humankind which will embrace such concepts as valuable and essential to human development. Historical perspective helps us to begin to formulate such a vision.

The Role of Historical Perspective

Socrates, Plato, Kant, Hegel, and Marx have all used history as a means of predicting the future. The economist and philosopher Robert L. Heilbroner (1960) described the "forces" of history as neither wholly arbitrary nor wholly unpredictable. Failure to see our current predicaments in a historical context, according to Heilbroner, dooms us to be forever unprepared to meet

the challenges of our age. Kuhn (1970) also shares this view.

It is impossible to gain perspective on the emerging new science without comparing it to the old Newtonian world view. In short, we can only know the new by examining the old. Historical perspective would seem vital to any understanding of transformational theory.

Historical reference may also help us to deal with the confusion and frustration that our current cultural crisis has presented us. Capra (1982) believes that a broad view is necessary to understand our current cultural crisis. He states:

We have to shift our perspective from the end of the twentieth century to a time span encompassing thousands of years; from the notion of static social structures to the perception of dynamic patterns of change. Seen from this perspective, crises appear as an aspect of transformation.

(p. 26)

As stated earlier, historical analysis as a means of framing the future has been a long standing practice. Several twentieth century historians have attempted to use history in such a way. Oswald Spengler (1918) in his Decline of the West began the modern era of historical speculation. By seeking to view world history in its total, and not just through a western perspective,

Spengler sought to explain the world crisis on the eve of World War I.

According to Mazlish (1966), Spengler denied a linear development in history, and instead reverted to a form of cyclical theory. A cyclical view of history maintains that certain themes or patterns of culture repeat themselves over time. It is this cyclical view of history that allows us to use history as a frame of reference for our own time. At the very least, we can examine what history may have to tell us about ourselves.

Transformational Theory

Transformational theory, as applied in this study, seeks to explore changes which are taking place in regards to our view of the world. Capra (1982) describes transformational theory as "a struggle to grasp a new reality" (p. 15).

To help grasp this new reality, many are turning to the language of quantum physics. Capra (1988) stated that the conceptual shift created by modern physics had also impacted the rest of society. In The Tao of Physics (1975) he states:

I believe the world-view implied by modern physics is inconsistent with our present society, which does not reflect the harmonious inter-relatedness we observe in nature. To achieve

such a state of dynamic balance, a radically different social and economic structure will be needed... (p. 17)

Kuhn (1970) believes that new paradigms emerge when old views (methods) fail to give us adequate explanations for certain phenomena. These anomalies, as these phenomena are called, have a sort of compounding effect. Too many anomalies may cause a shift in thinking. Kuhn (1970), gives us the examples of the Ptolemaic explanation of the universe giving way to the Copernican view and eventually the Newtonian view:

The state of Ptolemaic astronomy was a scandal before Copernicus' announcement. Galileo's contributions to the study of motion depended closely upon difficulties discovered in Aristotle's theory by scholastic critics. Newton's new theory of light and color originated in the discovery that none of the existing pre-paradigm theories would account for the length of the spectrum, and the wave theory that replaced Newton's was announced in the midst of growing concerns about anomalies in the relation of diffraction and polarization effects to Newton's theory... (p. 67)

Thus, we find ourselves today trying to find answers using the old Newtonian world view. But there seem to be

too many anomalies in our society today to find answers through this conception of the universe.

Again, the new physics ostensibly holds some promise for providing answers to these problems. Kuhn (1970) also stated that these anomalies can create an atmosphere of crisis. He states:

In all these cases except those of Newton the awareness of anomaly had lasted so long and penetrated so deep that one can appropriately describe the fields affected by it as in a state of growing crisis. (p. 67)

Curriculum theorists everywhere seem to focus on the crisis aspects of American education. Educational theorists such as Goodlad (1984); Eisner (1988); Apple (1990), and Tyler (1949) all refer in their texts to the "crisis" facing American education.

When A Nation at Risk: The Imperative for Educational Reform (National Commission of Excellence, 1983), was issued, numerous crises were spelled out in the document. Indeed, the entire document is peppered with the word crisis. It would be no great challenge to any student of curriculum to find numerous other examples of this crisis mentality. Yet, there seems to be a reluctance among curriculum theorists to seek new explanations.

Hayes (1991) points out most of the prominent

curriculum theorists are very much grounded in the Newtonian world view. This is to be expected. As Kuhn (1970) pointed out to us, "The transfer of allegiance from paradigm to paradigm is a conversion experience that cannot be forced" (p. 150). He proceeds to point out that those (in the scientific field), whose careers are tied directly to the older traditions, are to be expected to resist change.

The historian James Burke (1985) states, "All of us tend to frame our concept of truth by what we know (p. 10)." We are, in a sense, blinded by our own particular concept of reality. But what if those concepts are directly challenged? Must a crisis emerge?

Petirim A. Sorokin, a prominent sociologist/historian who wrote primarily during the period from 1930-1950, has postulated that Western culture is in the midst of profound change (Sorokin, 1941). Sorokin's central thesis was that these changes were inevitable, and had brought the Western world to a crisis stage in its development.

Purpose of the Study

The purpose of this study is to examine certain historical views on cultural transformation and compare them to transformational theories which are based on the new science of quantum physics. The study is designed to

discuss certain key questions, such as:

1. What concerns did the twentieth century cyclical historians, and in particular, Petirim A. Sorokin, address in their works?
2. Do the cyclical historians share any common ground with current transformational theorists?
3. As we approach the twenty-first century, do the twentieth century cyclical historians have anything to tell us that might clarify current transformational theory?

Dobson and Dobson (1981) state that all things which impact the child and the school constitute curriculum. It is reasonable, in light of this view of curriculum, to assume that transformational theory is directly related to the field of curriculum. Schubert (1986) states:

Some hold that curriculum in any society or culture is and should be a reflection of that culture. The job of schooling is to reproduce salient knowledge for the succeeding generation. The community, state, or nation takes the lead in identifying the skills, knowledge, and appreciation to be taught. It is the job of professional educators to see that they are transformed into a

curriculum that can be delivered to children and youth. (p. 29)

This view of cultural reproduction would seem to be widely held by school people. However, this view of the role of schools in reproducing culture becomes complex when one considers the implications of transformational theory. If our culture is in transition, who is to determine what should or should not be passed on?

Again, any questions dealing with cultural transformation should be seen as school (curriculum) questions. Indeed, William Heard Kilpatrick (1926) states in his book, Education for a Changing Civilization:

We must look as far into the future as we can to catch its problems. It is our duty as teacher to prepare the rising generation to think that they can and will think for themselves, even ultimately, if they so decide, to the point of revising or rejecting what we now think. (p. 60)

This statement would seem to mirror the crux of the transformational discussion: Old views, when examined, may very well give way to a new view. Educators, if we are to follow Kilpatrick's philosophy, must play an integral role in evaluating the extent to which our society is changing.

If, in fact, a new world view is emerging which is

sufficient to constitute a paradigm shift, it is my contention that a study of the factors involved in such a shift are of paramount importance to the development of curriculum theory.

Organization of the Study

This study is divided into five chapters. The general purpose of the study is to explore my central thesis that Western culture appears to be overly dependent on empirical means as a basis for shaping reality. Below I have provided a brief description of each chapter and its purpose.

Chapter I

Chapter I has put forth an explanation of transformational theory, and how transformational theory may relate to the field of curriculum. This chapter has also explored the use of history as a means of framing and analyzing cultural transformation. The general thesis of this study, that Western society is in a state of profound change, has been set forth.

Chapter II

This chapter serves as a means of introducing the historical development of the Newtonian world view. The chapter utilizes both primary and secondary sources. The

reader is asked to consider the social and philosophical implications of our dependence as curriculum theorists on the Newtonian model of science.

Also, the chapter seeks to connect Newtonian science to present day curriculum. The major assumption of the chapter is that modern curriculum is heavily dependent on the Newtonian paradigm for its language base.

Chapter III

This chapter introduces the views of the historians Giambattista Vico, Oswald Spengler, and Pitirim A. Sorokin. The chapter examines their views on Western culture. Comparisons are drawn between their various views.

The main focus of the chapter is on the views of Pitirim A. Sorokin. Sorokin's work on cultural transformation appears to mirror the works of Vico and Spengler regarding Western culture. Sorokin's concepts allow us to make several speculations regarding Western culture in the late twentieth century.

Chapter IV

Chapter IV of the study examines the language of quantum physics and its implications for developing a new philosophical base of the shifting paradigm. The works of Einstein, Bohr, Planck and others are examined. The

chapter postulates that the new sciences of quantum physics presents us with a suitable number of metaphors upon which to build curriculum theory. The chapter attempts to tie the works of Sorokin to the language of quantum physics.

Chapter V

And finally, Chapter V represents a direct attempt to link the language of quantum physics to school curriculum. The chapter postulates that, as metaphor, the new science opens up new avenues for curriculum development. Additionally, the chapter contains my personal speculation(s) on the implications of cultural transformation to curriculum theory.

CHAPTER II

THE EMERGENCE OF THE NEWTONIAN WORLD VIEW

Our contemporary world view began to take shape in the sixteenth and seventeenth centuries (Capra, 1982). The changes in how the world was viewed were profound. Capra (1982) describes the shift in thinking as a shift from an organic view of the world to a world view which emphasized order and reason. Faith and reason were to be replaced by prediction and control (Capra, 1982). The human mind began to perceive the world in an entirely different light. Of course, the changes brought about in the sixteenth and seventeenth centuries did not come about easily. For as Randall (1940) states:

Men are prone to regard the body of their beliefs as they do the hills to which they lift up their eyes, as fixed and immutable, and all departures therefrom as in the very nature of the case absurd. (p. 5)

Eventually, the scientific view of the world, as developed by the seventeenth century, became the accepted "immutable" world view.

The new view of the universe, once fully accepted,

formed an ideological base from which all aspects of human existence would be impacted. Not only scientific practice, but religion, the arts, education and philosophy in general were to be impacted by the emerging scientific paradigm (Bronowski, 1978).

Among the first scientists to put forth the new scientific view was Nicolas Copernicus. Capra (1982) sees the scientific revolution as having begun with Copernicus. Copernicus repudiated the view that the universe evolved around the earth. He, instead, sought to prove mathematically that the sun was the center of our universe. Kepler, Galileo, Bacon and later Newton all formulated mathematical proofs of a heliocentric universe (Palmer, 1984). Mathematics rapidly became the language of the scientists (Randall, 1940). Consequently, to be truly scientific something had to be subject to mathematical proofs. The universe was now being seen as determinate (Randall, 1940). Man's position with nature was no longer seen as a partnership but more as one of dominance (Ferguson, 1980). With science man could control (harness) nature. The organic view of the world began to fade away and the determinate (control) view took its place (Capra, 1982). It followed that the universe was now to be viewed as predictable, even simplistic. Copernicus (1539) states:

After long and careful investigation I have found

that when the motions of the other planets are referred to the circulation of the earth and are computed for the revolution of each star, not only do the phenomena necessarily follow therefrom, but the order and magnitude of the stars and all their orbs and heaven itself are so connected that in no part can anything be transposed without confusion to the rest and to the whole universe. (Randall, 1940, p. 52)

Thus, Copernicus reveals to us his growing faith that this new mathematical science was capable of explaining the universe in total. Galileo, Kepler, and most of all, Newton were to deliver this message to the rest of the world (Palmer and Colton, 1984).

The Cartesian World View

Rene Descartes has been described as the founder of modern philosophy (Capra, 1982). Descartes was to apply to philosophy what had been taking shape in the scientific community. The old Aristotelian view of nature had sought to explain nature as having sought perfection in its own way. That view was to be replaced by the new mathematical explanation of nature. As Galileo states:

Nature's laws are both regular and simple, every one of her acts occurring *per la via brevissima*,

by the shortest way. This eternal necessity of law is fundamentally mathematical; hence by mathematics alone we can penetrate to them, and by reason of this mathematical constitution of the world, our mathematical knowledge can be applied to experience...There is no certitude where some one of the mathematical sciences can not be applied...the bird is a machine working through mathematical laws. (Randall, 1940, p. 236)

Galileo's view was the prevailing view of science, and Descartes was to embrace this view and apply it to philosophy. A mathematical interpretation of nature was at the heart of Descartes' philosophy. In short, he sought to build a philosophy as certain as mathematics (Bronowski, 1978).

Descartes determined that nature must be explained mechanically, without the aid of forms, ideas or universals (Frost, 1942). He, then, has placed the mechanistic metaphor as his central philosophical thesis. Descartes felt that substance was the key to understanding the universe (Frost, 1942). Descartes states that, "at the base of everything in the universe, of all bodies, is substance" (Frost, 1942, p. 32). Descartes was to conceive two types of substances, mind and body. Mind and body, according to Descartes, both were independent of

each other. Both, however, stemmed from God, the absolute substance (Frost, 1942).

By separating the mind and the body, Descartes had allowed his philosophical view of nature to proceed unhindered by metaphysical questions. Metaphysics was a product of the substance of mind, nature was of body substance. Randall (1940) states:

To Descartes thenceforth space or extension became the fundamental reality in the world, motion the source of all change, and mathematics the only relation between its parts...He had made of nature a machine and nothing but a machine; purposes and spiritual significance had alike been banished. (p. 241)

By removing all mystical aspects from his world view, Descartes had begun the process of replacing the organic view of nature from philosophy. So Randall (1940) puts it, "the whole working out of mechanical physics in the next two centuries is but the development of this idea" (Randall, 1940, p. 242). But what of the other half of Cartesian dualism, the mind? Descartes had not excluded God from his philosophy. On the contrary, God was the essence of all substance. However, whether wittingly or not, Descartes had laid the foundations for a conception of the universe that would increasingly ignore the spiritual as a genuine scientific concept. God would

eventually have no place in the scientific world.

By following the method of Descartes, scientists could now pursue their studies of nature without concerning their work with the mind (Frost, 1942). This distinction between the material world and the mental (mind) world would have implications beyond science. As the belief in certainty as the proof of scientific knowledge increased, so did the application of this philosophy to other areas. To Descartes this vision of certainty extended to all fields of learning (Capra, 1982).

In summary, it can be said that Descartes represents a break from the intellectual tradition of European philosophy (Neill, 1949). Religion (and to an extent even reason itself) was relegated to a realm outside of science. Philosophers and philosophy became less important. Descartes had placed the mind as being central to human existence and he has the mind operating separately from the body (Gardiner, 1985). With this separation modern science would build its foundation. Descartes had opened the way for such thinkers as Isaac Newton.

The Newtonian World View

Randall (1940) describes Descartes' cosmic picture as merely a sketch. A framework which was still in need of being filled in. Isaac Newton was the brilliant mind who

completed the picture Descartes had drawn. Newton's laws were able to provide explanations. Real quantifiable explanations that were not hindered by the doubts of Descartes. As Pagels (1982) states:

Newton's laws brought order to the visible world of ordinary objects and events like stones falling, the motion of planets, the flow of rivers and the tides. The primary characteristics of the Newtonian world view were its determinism--the clockwork universe determined from the beginning to the end of time. (p. 64)

This ordered mathematical universe espoused by Newton was in part the realization of Descartes' dream of a complete mathematical philosophy. Newton's formula(s) seemed to have the answers to everything.

Newton's basic theory centered on the laws of motion (Palmer and Colton, 1984). He was able to apply both inductive and deductive reasoning to form a coherent interpretation of how the universe operated (Capra, 1982). Newton's laws of motion were fixed and immutable (Capra, 1982). In the Newtonian view, time and space were fixed entities (Pagels, 1982). God was seen as having set the universe in motion, and once having done so, sat back to watch it work (Capra, 1982). In such a scheme man was now able to predict the position of planets, etc. with virtual certitude (Capra, 1982).

Since the physical properties of the universe were seen as part of the body Descartes had described, it followed that the universe was no longer to be viewed from a metaphysical viewpoint. These were concrete, observable phenomena being discussed by Newton. Newton (1642-1727) developed a cardinal rule which promoted the concept of a universe being governed by natural causes only. He states:

We are to admit no more causes of natural things that such as were both true and sufficient to explain their appearances. Therefore, to the same natural effects we must, as far as possible, assign the same causes...For since the qualities of bodies are only known to us by experiments, we are to hold for universal qualities of all bodies whatsoever...We are certainly not to relinquish the evidence of experiments for the sake of dreams and vain fictions of our own; nor are we to recede from the analogy of nature, which uses the simple, and consonant with itself. (Capra, 1982, p. 66)

An analysis of Newton's famous rule can tell us much about his views. "We are to admit to more causes of natural things", indicates that we are not to accept metaphysical explanations for how nature operates. There will always be a natural (mathematical) explanation to be

had. "The evidence of experiments"...leads us to the conclusion that truth can only be obtained by experimental method. We are warned not to waste time following dreams. Our intuition (vain fiction) will surely mislead us. Nature is described by Newton as simple. Follow simple mathematical calculations and the truth of nature will be revealed.

Newton's principal rule became the guiding force for science (Randall, 1940). Newton's method, an analysis by observed facts and the mathematical formulas set forth by him, came to be associated with true science (Randall, 1940).

Newtonian mechanics were used with tremendous success during the eighteenth and nineteenth centuries (Capra, 1975). Newton's system was capable of allowing scientists to make some very accurate observations about the universe (Palmer and Colton, 1984). This success encouraged the application of Newtonian mechanics to other areas of the human experience. Soon all the social sciences were being impacted by the scientific revolution. Capra (1982) refers to the social scientists' claim to having discovered "social physics." In short, credibility was linked to the extent by which something could be submitted to rational experimentation. The modern mind, by the end of the nineteenth century, was immersed in the Newtonian world view.

The Impact of the Newtonian
View on Culture

John Locke (1690) perhaps did more than anyone to extend Newtonian logic to the social sciences. Capra (1982) states:

Locke attempted to reduce the patterns observed in society to the behavior of its individuals. Thus he proceeded to study the nature of the individual human being, and then tried to apply the principles of human nature to economic and political problems. (p. 69)

Locke (1690) in An Essay Concerning Human Understanding, contended that all of our ideas come from experience, either from sensation or by reflection (Magill, 1990). Our ideas, the empirical method set forth by Locke, have had a profound impact on the social sciences. Locke stressed experience (and experimentation) as the basis of true knowledge; even to the extent of writing extensively on how to acquire certain skills (Phillips, 1987). Positivism, that branch of the social sciences that believes the object of science must be only what we can positively know, can be seen as having derived its philosophical base from the empirical views of Locke (Randall, 1940). The empiricists grew less and

less tolerant of those views which could be seen as irrational. Randall (1940) states:

The empiricists sought to remove the dead weight of the past by discovering the natural history of the origin and growth in the mind of the ideas connected with objectionable and outworn beliefs and customs. They tried to show up the irrational origin of things which they hated.

(p. 272)

Thus anything that could be labeled irrational was unacceptable to the empiricists. Religion, morals, politics, etc. were exposed by the empirical school as being profoundly irrational. Hume (1711-1776) took this view to its extreme by stating, "no knowledge for which some antecedent sense impression was not discoverable could claim any validity" (Frost, 1942). Increasingly, faith was being replaced in the modern world of the eighteenth and nineteenth century. In its place was belief, belief in the scientific method. The emphasis on mathematics as the basis for philosophical thought reached its peak in the twentieth century with the Logical Positivists.

Auguste Comte (1798-1857) has often been described as the father of positivism (Windelband, 1958). Comte felt that the scientific revolution had not been introduced to other fields of human inquiry sufficiently. He sought to apply science to social, political, moral, and religious

thought (Stumpf, 1975). Comte believed that knowledge could only be obtained through observation and experience (Frost, 1942). It was the role of man to see what was required and experiment to obtain the required results. As Comte states, "any proposition which does not admit to ultimately being reduced to a simple enunciation of fact, special or general, can have no real or intelligible sense" (Stumpf, 1975, p. 373). Thus, Comte tells us that facts, observable facts, are what counts. He has laid the groundwork for pragmatism, in that the only way truth can be obtained is through this sense experience. Later philosophers, William James, John Dewey and others were greatly influenced by the sociology of Comte (Phillips, 1987). The basic principle that positivism was to build on was that something has meaning only if it can be empirically verified. So Phillips (1987) states:

The principle they hit upon stated that something is meaningful if and only if it is verifiable empirically (i.e. directly, or if charitable, indirectly, by observation via the senses), or is a tautology of mathematics or logic. This has been parodied as "if it can't be seen or measured, it is not meaningful to talk about".

(p. 39)

Positivism rejects metaphysical explanations as unknowable and therefore not verifiable. Popper (1968)

states that the goal of the positivists was to render metaphysics as meaningless nonsense. The impact of the positivist philosophy on the social sciences appears to have been profound. The positivist approach brought a degree of unity to the social sciences. Good sociologists, historians, etc. were expected to follow certain methodologies to be accepted. As O'Connor (1964) states:

The Logical Positivists contributed a great deal to the social sciences. They brought to philosophy an interest in cooperation...They adopted high standards of rigor...and they tried to formulate methods of inquiry that would lead to commonly accepted results. (p. 508)

The accepted results would be those based upon scientific inquiry.

Logical positivism perhaps revealed its part with the followers of Bertrand Russell in the twentieth century. Russell sought to bring all philosophical language into the realm of mathematics. Russell chided many a philosopher for lacking the proper mathematical skills (Phillips, 1987).

It is logical to conclude that the Newtonian world view directly shaped Western culture from the late seventeenth century forward. Virtually every aspect of Western society came to be influenced by the scientific method laid forth by the Newtonian view. Capra (1982)

has explored the impact of Newtonian physics on medical practice and economic strategy. Dubos (1968), Ferguson (1980), and Capra (1982) all indicate that our view of the environment has been structured by Newtonian concepts.

Capra (1982) feels that medical practice has adopted the reductionist tools of the Cartesian model. He states:

The biomedical model is firmly grounded in Cartesian thought. Descartes introduced the strict separation of mind and body, along with the idea that the body is a machine that can be understood completely in terms of the arrangement and functioning of its parts. (p. 140)

Knowles (1977) in his book Doing Better and Feeling Worse, has written extensively on the failure of modern medicine to concern itself with criteria other than physical ones. Capra (1982) cites the tendency of medical practitioners to use a mechanistic approach when discussing prevention of disease. Ferguson (1980) sees modern medicine as having excluded the subjective realm from medical practice. Physicians are likely to view the mechanistic model as being the most expedient method of practice. Lyng (1988) has directly related the dominant medical model of today to the mechanistic mind set forth by the Newtonian paradigm. Ferguson (1980) uses the

following descriptions to describe the Newtonian paradigm for medicine:

1. efficient;
2. primary intervention;
3. mechanistic (body as machine);
4. separateness (mind and body);
5. quantitative;
6. environmental prevention. (p. 247-248)

These descriptions of the current medical paradigm clearly indicate how the language of Cartesian-Newtonian paradigm has come to influence everyday life. Ferguson (1980) has shown that the mind body duality concept is dominant within the medical community. Lyng (1988) has also suggested that medicine is grounded in the concept that mind and body are separate. Accepted medical practice is that which follows a prescriptive procedure based on patients being seen as machines who must be fixed (Ferguson, 1980).

Perhaps nowhere has the influence of the Newtonian paradigm been more apparent than in the area of economic philosophy. Since the eighteenth century, economic philosophy has tended to emphasize progress as a measure of success (Capra, 1982). Adam Smith (1776), often considered to be the father of modern capitalism, emphasized the application of natural law to economic theory (Heilbroner, 1960). To Smith, if there were

ordered laws which governed the universe, there had to be set principles which could result in maximum economic progress (Smith, 1776). Smith took a reductionist view towards economic theory. He emphasized the division of labor, and focused on the production levels in his analysis (Knoles and Snyder, 1960).

Smith's message was one of extreme individualism. Economics was made a science by Smith, and the science was grounded in the Newtonian model. Smith's labor theory of value stressed that a product only has value based upon the amount of labor that has gone into it (Heilbronner, 1982). Worth or value became associated with materialistic factors. The science of economics developed around these materialistic factors. Capra (1982) states:

With the Scientific Revolution and the Enlightenment, critical reasoning, empiricism, and individualism became the dominant values, together with a secular and materialistic orientation that led to the production of worldly goods and luxuries, and to the manipulative mentality of the Industrial Age...the theorizing about a set of specific economic activities--production, exchange, distribution, money-lending--which suddenly stood out in sharp relief and required not only description and explanation

but also rationalization. (p. 195)

Quantitative means (mathematics) became the primary means of evaluating the success or failure of economic policy. The use of deterministic language is by no means limited to capitalism. Socialism, which began to develop rapidly in the eighteenth and nineteenth centuries, also made use of scientific principles in its philosophy. Capra (1982) believes that Karl Marx made much use of scientific jargon in the development of his communist philosophy. Capra (1982) states:

Marx was very concerned about being scientific, using the term "scientific" constantly in the description of his critical approach. Accordingly, he often attempted to formulate his theories in Cartesian and Newtonian language.

(p. 208)

Marx's dialectic is very linear in nature. It seeks to explain the course of human history as having led directly to the communist state (Capra, 1982). Marx seems to be very proud of the fact that Marxism can be promoted as a science. If marxism is a science, it is a science directly influenced by the Newtonian paradigm.

Capra (1982) indicates that this mathematical deterministic approach to economics has led to an excessive reliance on growth. Growth, which can generally be viewed as a logical consequence of linear theory in

general, has become the goal of economics. To become bigger is to become better. The role of the economist is generally viewed as that of an analyst who can predict certain growth or decline patterns. In the United States the well being of our nation is measured by economic progress (Toffler, 1990). To a large extent, science theory in the United States has been built on the economic model. Frederick Winslow Taylor (1856-1915) advanced the theory of scientific management (Current, Williams, Friedal, Brinkley, 1987). Scientific management stressed the need for modernization of the manufacturing process. Subdivisions of tasks, new machines, proper management, production efficiency and control all became elements of this new philosophy (Current, Williams, Friedal, Brinkley, 1987). Scientific management was very much in keeping with the philosophies of science and progress. No area of American culture was impacted more by this scientific view than our schools.

The Impact of the Dominant Paradigm on Curriculum

Thomas Kuhn (1970) in his work The Structure of Scientific Revolutions has stressed the fact that scientists tend to identify themselves with the existing paradigm that is most comfortable for them (almost always

the dominant paradigm). Dobson, Dobson, and Smiley (1991) believe this is true of curriculum theorists as well:

Curricular workers, through their induction into a professional culture, usually demonstrate allegiance to an identifiable paradigm.

Curriculum theorists share knowledge construction bases and convert to common rules and standards for theorizing. (p. 41)

As do scientists, curriculum theorists also seem to seek the most comfortable language base from which to operate. It is logical for curriculum workers to espouse theory based upon the dominant paradigm. Many suggest that the Cartesian-Newtonian paradigm has dominated curriculum development for most of the nineteenth and twentieth centuries. Many have cited the emphasis schools have placed on production as an example of the dominant Newtonian paradigm at work. Students, teachers and administrators tend to be viewed as parts of the factory. And the goal of the factory is to produce a product that will enable society (particularly the economy) to grow and prosper. The student tends to be seen as simply a part to be reduced and scrutinized. Ferguson (1982) sees the school curriculum as reductionist in nature. Kliebard (1972) has used the industrial metaphor to describe school curriculum. Dobson, Dobson, and Koetting

(1985) have also decried the industrial metaphor in their discussion of school curriculum. Simple evidence exists to warrant the use of the industrial metaphor in describing curriculum, and for the prevalence of the Cartesian-Newtonian paradigm in all aspects of school curriculum.

Oliver (1989) has stated:

Reforms in schooling and curriculum have been and are constructed within the modern paradigm: how do we remove the oppressive obstacles of our feudal past, e.g., slavery, racism, autocratic government, unequal chances in life; how do we improve the liberal democratic state as the central institution of governance; how do we make work more efficient and rewarding in the factory and office building?...framed in these ways, education is a specialization function, its problems technical problems. (p. 30)

Oliver's view of curriculum as technologically based and as a product of our dominant culture, is one shared by many curriculum theorists. Hayes (1991) has demonstrated that many curriculum theorists believe the Cartesian-Newtonian model to be the dominant model for curriculum theorizing.

The application of scientific management to curriculum development has manifested itself in many ways. Primarily, it has led to the attempts to analyze curriculum,

to break it down for specific study. As Tanner and Tanner (1975) state:

...the notion of curriculum as a production system has been embodied in the doctrine of specific "behavioral" objectives; behaviorism and the theory of operant condition; developments in instructional technology, including systems analysis; performance contracting and accountability. (p. 27)

This structured view of curriculum was advanced by Franklin Bobbitt as early as 1918 (Tanner and Tanner, 1975). Bobbitt (1918) was attempting to reduce curriculum to a series of practical endeavors. This method of objectivising school curriculum was based directly on production models of business and industry (Tanner and Tanner, 1975). Bobbitt (1918) states:

Curriculum making is the job of the "educational engineer"...In its simplest forms it involves the analysis of definite operations, to which the term job analysis is applied, as in the analysis of the operations involved in running a machine. (p. 32)

Thus Bobbitt's How to Make a Curriculum had brought the Newtonian notion of the world as machine squarely home to the schools. Tanner and Tanner (1975) cite the influence of the behavior theorists such as B.F. Skinner on school

curriculum. Their list of Skinner objectives include:

1. gaining and controlling attention;
2. learner outcomes;
3. recall;
4. learning tasks;
5. essential performance;
6. feedback;
7. appraisement of performance. (p. 28)

Despite denial on the part of many behaviorists, the above list clearly indicates an emphasis on the linear and mechanical aspects of human behavior. In this case the Cartesian-Newtonian paradigm has provided the language base for structuring this type of curriculum.

Similarly, recent curriculum theorists have advocated a rational view for curriculum development. Tyler (1949) advocated a planned school curriculum based upon specific objectives. He states:

All aspects of the educational program are really means to accomplish basic educational purposes.

Hence, if we are to study an educational program systematically and intelligently we must first be sure as to the educational objectives aimed at.

(Tyler, 1949, p. 3)

We see in Tyler's position the pure rational approach to curriculum. In order for curriculum to be adequate it must serve certain purposes and follow a systematic path.

As with Bobbitt's industrial model, Tyler places a great deal of emphasis on the product. What is to be produced and for what purposes become the essential question within the Tyler model. In case there is doubt as to the emphasis Tyler (1949) places on objectives within the curriculum, consider this following statement:

We are devoting much time to the setting up and formulation of objectives because they are the most critical criteria for guiding all the other activities of the curriculum matter. (Tyler, 1949, p. 62)

Tyler has shown us that all other criteria mean little when compared to objective standards. We can infer from this that all subjective means of implementing curriculum must be secondary (if considered at all). Clearly, the scientific method (objectivity) dominates the Tyler method.

Other curriculum theorists such as Madeline Hunter have also promoted the idea of an orderly objective curriculum (Doll, 1989). Doll sees in this methodology an attempt to directly apply Newtonian logic to curriculum. He states:

Direct correlations can be made between Madeline Hunter's or Ralph Tyler's notions of an orderly curriculum with ends preset and Newton's idea of a stable universe with planets rotating around

the sun in perfect harmony. (p. 244)

The application of Newtonian logic to curriculum by Tyler and Hunter seems to fit in with Kuhn's (1970) position that scientists, and in this case curriculum theorists, tend to view the existing paradigm as an absolute. He tells us:

The transfer of allegiance from paradigm to paradigm is a conservative experience that cannot be forced. Lifelong resistance, particularly from those whose productive careers have committed them to an older tradition of normal science...The source of resistance is the assurance that the older paradigm will ultimately solve all its problems. (pp. 150-151)

The popularity of Hunter and the back to basics movement would indicate a reluctance on the part of modern curriculum theorists to depart from the dominant paradigm. Similarly, the rush to the behaviorist's views of Kerner and Popham in the sixties and seventies, may be viewed as an attempt to solve curriculum problems through the comfortable language of the dominant paradigm (Doll, 1989). Doll (1989) states:

Connections can also be made between B. F. Skinner's or James Popham's view of expressing learning in discrete, quantifiable and linear units and Newton's approach to the

calculus. (p. 244)

Even those theorists who have generally been associated with "progressive" aspects of education can be listed directly as adherents to the dominant scientific (Newtonian) paradigm. Eliot Eisner (1985) has identified Dewey and Thorndike with a reliance upon scientific technology in their theories (Brown, 1989). Indeed, any examination of Dewey's language leads us back to a scientific perspective. Inquiry, scientific inquiry, is the key to understanding both Dewey and Thorndike. Brown (1989) quotes Eisner as having identified these men with the model approach to curriculum. According to Eisner, this approach has effectively precluded other views from entering the curriculum debate (Brown, 1989).

The search for explanations has always been an identifying characteristic of the Cartesian-Newtonian paradigm. Curriculum theorists seem to seek explanations in much the same way. As Dobson and Dobson (1985) have pointed out, it was believed that the stockpiling of knowledge about how the world works would eventually produce adequate explanations. Curriculum theorists find their very language rooted in a particular philosophy (Dobson, Dobson, and Koetting, 1985). The Cartesian-Newtonian world view has been so dominant as to touch virtually every aspect of twentieth century thought. Based upon this supposition, it is easy to see the impact

of Newtonian logic on curriculum.

Historical Perspectives

The cyclical historians can be defined as those historians who believe that history runs in definite patterns or cycles. One such historian, Pitirim A. Sorokin, came to the belief that cultures develop in distinct ways and come and go in periods of three to six hundred years. Sorokin theorized that the culture Western society has been based on, that of the Newtonian world view, is in its last stages of existence. Sorokin maintained that Western culture has become too materialistic and has simply worn itself out (Sorokin, 1941). It is to Sorokin and the cyclical historians that we can turn to explore the implications of Newtonian science on Western culture.

CHAPTER III

CULTURAL TRANSFORMATION: CYCLICAL

HISTORY AND THE WORKS

OF PETIRIM SOROKIN

Culture can be difficult to define in specific terms. Some would define culture in terms of institutions, customs, and through the activities of people's daily lives (Verene, 1970). Others would view culture in a more general sense, seeking to define culture in terms of the culture of a nation or world cultures (Verene, 1970). The American Heritage Dictionary (1970) defines culture as follows:

Social and intellectual information. The totality of socially transmitted behavior patterns, arts, beliefs, institutions, and all other products of human work and thought characteristic of a community or population. A style of social and artistic expression peculiar to a society or class.

(p. 321)

If one accepts all of the above definitions as aspects of culture, we can see some contrast. Verene (1970) contrasts the view of culture as, "that of a particular society and that of the meaning of human existence

itself" (p. 1). Those who view culture in a limited way (through a societal view) may characteristically be ignoring the broader (more holistic) view of culture. To limit one's view of culture is to fix one's self in current trends or patterns. Our current linear view of history tends to limit us to a specific view of culture (Heilbroner, 1960). Burke (1985) has indicated that we tend to frame knowledge (and thus culture) around prevailing theory. Theory then dictates what we know. Anything new or unknown must be defined in terms of the structure of the theory (Burke, 1985). He states:

The implications of this are that, since the structure of reality changes over time, science can only answer contemporary questions about reality defined in contemporary terms and investigated with contemporary tools. Logic is shaped by the values of the time. (p. 336)

Thus, many tend to dismiss older cultural values as having very little meaning to our own particular time or situation. Varenne (1970) calls for a broader view of culture, one that does not limit our views of what is good or bad to contemporary notions alone. As has been mentioned, the Newtonian world view tended to promote a progressive linear view. Old views tended to be dismissed as outdated or even as nonsense by the Newtonian scientists (Burke, 1985). By the eighteenth century, The

Age of Enlightenment, the measure of cultural value was shifting from a focus on the past to a view that was centered around the new Newtonian science (Palmer and Colton, 1984).

Oliver (1989) has argued that our modern view of culture is inadequate to explain our current problems.

He states:

The modern statement of the human condition--its blessings, its problems, and the resolutions of these problems within its own terms--is grossly inadequate to explain our contemporary misgivings about how we feel, what we are about, where we are going as modern people. (p. 7)

Oliver implies that the modern view is too limiting and he calls for a more complex view of culture. By modern, Oliver means that restricting our views to that of modernity has led to an over emphasis on technical aspects of knowing (Oliver, 1989). This over emphasis on technology he calls the technical fallacy (Oliver, 1989). To Oliver such a technical view is self defeating and actually inhibits our ability to solve problems within our culture. Oliver (1989) calls for cultural balance. To obtain cultural balance it is necessary to think historically and begin to look at other cultures, past and present, for meaning (Oliver, 1989). He states:

Our thesis is that healthy culture requires that

we apprehend, at least in some dim way, a sense of universe/nature/culture that embraces a range and balance of metaphors, metaphors which extend our ontological feelings toward reflective conscious meaning. (p. 20)

Pitirim A. Sorokin (1950) dealt specifically with the fragmentation of modern society (Oliver, 1989). Sorokin's historical research into culture and its various aspects, represents one of the most exhaustive historical studies of the twentieth century (Allen, 1963). Sorokin placed culture in two broad categories, the Sensate and the Ideational (Oliver, 1989). Sensate culture placed its values on sensory perception (that which can be ascertained as true through the senses), while the Ideational culture placed its criteria for truth on God and God's words for its inspirations (Sorokin, 1950). Sorokin also identified a third type of culture known as the Integral. The Integral culture was seen as having shared aspects of both the Sensate and Ideational cultures (Oliver, 1989).

Sorokin's views represent a synthesis of sorts of the views of earlier cyclical historians. Although many of his views seem to be wholly original, it seems clear that he built his philosophy from cyclical theory dating as far back as the early eighteenth century. It is my contention that by examining the roots of cyclical history, we derive an understanding of Sorokin's views

and the implications those views hold for contemporary humankind.

Forerunners to Sorokin:

Vico and Spengler

In general the theory of cyclical history implies that events occur in certain cycles and contain certain similarities to each other (Weiner, 1973). The belief in historical cycles can be traced as far back as to Babylonian times and to the philosophy of Plato (Weiner, 1973). Aristotle had put forth the idea of degeneration within governments (Heilbroner, 1960). According to Aristotle governments began as monarchical entities, then degenerated into oligarchies, then to tyrannies, and eventually to a democracy (Wiener, 1973). Although it does not appear that Aristotle meant that these cycles had to occur, he infers that extraordinary events could lead to their repeating themselves (Wiener, 1973). Thus, through the works of the Ancients groundwork was laid for the development of a more encompassing theory of cyclical history. By the eighteenth century such a theory was developed by Giambattista Vico.

Views of Giambattista Vico (1688-1744)

Vico has been described as one of the greatest Italian philosophers (Copleston, 1985). Vico was the

first to attempt to develop a universal history based upon empirical grounds alone (Nash, 1969). Vico was to depart from the prevailing view of history as linear in nature. To Vico history was at times linear, but also followed certain cyclical patterns. Nash (1969) has called Vico's view a spiral pattern of history. Vico was to emphasize that history had a place in and of itself. It could exist without having to defer to science. Vico emphasized the importance of the arts in evaluating the past and the future. He decried the emphasis that was being placed on Newtonian science at the expense of the study of humane letters (Mazlish, 1966). Vico warned historians about undervaluing linguistics, mythology, and tradition when writing history (Nash, 1969). These positions put him in direct conflict with the Cartesians. Descartes had stated:

The overcurious in the customs of the past are generally ignorant of those of the present. Besides, fictitious narratives lead us to imagine the possibility of many events that are impossible, and even the most faithful histories, if they do not wholly misrepresent matters, or exaggerate their importance to render the account of them more worthy...hence the remainder does not represent the truth. (Nash, 1969, p. 27)

Hence it is little wonder that in the scientific

atmosphere of the seventh century, that Vico's call for a history based on adherence to factors other than scientific method was largely rejected. Vico does not reflect knowledge, for he believes that man has created his own knowledge. Man can have knowledge of that which he has created (Copleston, 1985). But what he does reject is the Cartesian view that implies that nature can be known through the mathematical and physical sciences (Nash, 1969). God, to Vico, was the only entity that could fully know nature. As Flint (1884) states:

Vico implies that there is no human truth outside of human knowledge, just as there is no divine truth outside of divine knowledge...the truth is what is known, to be known it must be made; the knowing and the making of truth are inseparable.

(Flint, p. 94)

Vico seems to be freeing himself of the positivistic chains of the Newtonian science. He could now pursue history through what man had created, i.e. his languages, history, law, religion, and even mythology. (Nash, 1969)

In his work Scienza Nuova (New Science), Vico brought forth his philosophy of history. Vico was to see history as having been developed in three distinct stages (Copleston, 1985). He described these periods of history as the Age of Gods, Age of Heroes, and the Age of Men (Nash, 1969). The Age of Gods was characterized by a

strong adherence to family principles. Religion played a major role during the Age of Gods. Man in this stage was fierce and cruel in nature (Nash, 1969). But the instability inherent in such a stage was to give way to the demands for more equality, new orders were established resulting in the Age of Heroes. Nash (1969) has described this stage as one of imagination, where men were able to prevail over others, resulting in an aristocratic stage. But this stage too would be undermined by the desire for equality among the masses. The Age of Heroes gave way to the Age of Men which was essentially democratic in nature (Copleston, 1985). The Age of Men was the Age of Reason. Rationality was to replace the religious aspects of men's lives. But in the process he was to become more benign (Nash, 1969). Table I, shown on the following page, demonstrates the stages Vico saw for man. As stated, each stage was seen as a movement toward a more materialistic existence.

Vico's cyclical theory does not end with the Age of Men. For in the third stage there were factors which would contribute to its own decay. Religion in the Age of Men had been replaced by barren intellectualism (Copleston, 1985). Equality led to a decline in public spirit, and decadence became widespread (Copleston,

TABLE I
SCHEMA FOR VICO'S THREE STAGES

	Age of Gods	Age of Heroes	Age of Men
Emphasis:	Sensation	Imagination	Reason
Nature:	Cruel and fierce	Proud and noble	Benign
Government:	Theocratic	Aristocratic	Democractic

1985). With the factors timing Age of Men, a new cycle would begin. All of this is due to the will of God, according to Vico (Nash, 1969).

Copleston (1985) points out that Vico's theory is not completely fatalistic in nature. In fact, progress can be made and one religion (example Christianity) may indeed be superior to that which it replaced. In sum, Vico's philosophy of history was ahead of its time, in that he not only developed a cyclical theory of history, but he had accurately anticipated the impact of the Newtonian scientific method on the social sciences. We can summarize Vico as follows:

1. He believed the only certain knowledge to be that knowledge which we ourselves have created.

2. He refutes Descartes' claim of having discovered one valid scientific method.
3. He proposes that we not interpret past cultures through our own accepted norms and customs.
4. He asserts that man can only be understood historically.
5. He rejects the emphasis of mathematics and the physical sciences in knowledge theory.
6. He sees history as largely non-linear.
7. He emphasizes all aspects of culture for gaining a true understanding of history.

Vico's work was to lay the foundation for Sorokin and other twentieth century cyclical historians. Sorokin's own approach to cultural studies seems to be patterned after Vico's method. At the very least, Vico set forth a way of viewing history that was quite different from the prevailing historicism of the eighteenth century, a view that began to be noticed by Spengler and Sorokin in the twentieth century (Mazlish, 1966).

Spengler's Philosophy of History

Oswald Spengler (1880-1936) made a major contribution to the philosophy of history with his work The Decline of the West (Edwards, 1967). Spengler set forth a philosophy similar to Vico's cyclical theory. Cultures,

according to Spengler, go through seasonal changes. Their early heroic period is signified by its rural, agricultural, and feudal aspects (Edwards, 1967). Summer brings a movement to the cities and the development of the art. Autumn represents the full growth of cities and the arts. Similar to Vico's schema, religion is being replaced by the rational in the autumn period (Gardiner, 1959). The winter is representative of the decline of its arts, the moral condition of its people, and a growing concern with mere materialism (Edwards, 1967). Spengler, when he published Decline of the West in 1918, viewed Western culture as being in its autumnal stage (Nash, 1969). Since World War I had been going on almost three years by 1918, Spengler's work seemed to have particular meaning to most Europeans at the time. Table II, shown on the following page, represents the schema by which Spengler represented the transitional stages man passes through.

Spengler views cultures as having a typical lifespan of about 1,000 years (Spengler, 1918).

Spengler defined culture as a conception involving a people's art, religion, and philosophy (Edwards, 1967). Like Vico, he feels an examination of the whole of a culture is important to the understanding of it. Culture to Spengler is an organism (Mazlish, 1966). By forming culture in the biological metaphor he asks us to view

culture as we would any other living creature (Spengler, 1918).

TABLE II
SCHEMA FOR SPENGLER'S VIEW
OF CULTURAL CHANGE

Spring	Summer	Autumn	Winter
epics, sages, mystical	individual artists	enlighten- ment (rationale)	skeptical/ materialism
rural, agricultural	cities	growing cities	megapolis
feudal	city states	monarchy	political training

Therefore, he sees cultures as having specific life cycles of birth, youth, age, and eventually death (these are analogous to Spengler's seasons). Death is seen as inevitable, as with any living organism (Mazlish, 1966). Spengler refers to this organic view of culture as a morphology of world history (Spengler, 1918). He states:

A morphology of world history, of the world-as-history in contrast to the morphology of the world-as-nature that hitherto has been almost the only theme of philosophy. And it reviews

once again the forms and movements of the world in their depths and final significance, but this time according to an entirely different ordering which groups them not in an ensemble picture of everything known, but in a picture of life, and presents them not as things-become, but as things becoming. (Gardiner, 1970, p. 45)

As with Vico, Spengler rejects the mechanical world view. His organic system of culture is alive and functioning.

Spengler concentrated his work in the classical, Arabic and Western cultures (Mazlish, 1966). But clearly it was Spengler's analysis of Western culture, and his predictions of its eventual downfall, that made Spengler interesting to so many in 1918. Like Vico, he saw Western man as having become too rational, too dependent on the scientific spirit. The cultural revolt that Spengler projected was merely a part of the morphological process all cultures must pass through (Nash, 1969).

Additionally, Spengler's cyclical theory of history was decidedly relativistic (Nash, 1969). Each culture by Spengler's accounting is wholly independent of one another and as such all beliefs are relative to one another (Nash, 1969). Therefore, each culture should not be valued more than another culture.

Relation of Vico's and Spengler's
Theories to Sorokin

Both Vico and Spengler present a cyclical view of history. It is this cyclical view that Sorokin would seek to build on. As with Vico and Spengler, Sorokin's thesis sought an explanation of history that went beyond the traditional linear view. Sorokin repeatedly paid homage to the earlier cyclical historians for having laid the groundwork for his own philosophy of history (Sorokin, 1950).

Spengler's view of an organic culture has also had an impact on Sorokin (Nash, 1969). Sorokin, too, tended to see cultures in the organic sense. Cultures to Sorokin are indeed live, functioning entities capable of being viewed and studied as such. While it is clear that Vico and Spengler's theories give us insight into Sorokin's concept of culture and cultural transformation, it is Sorokin's own exhaustive studies that make him worthy of study. With the possible exception of Sorokin's own contemporary, Arnold Toynbee, no one has ever offered such an exhaustive analysis of culture as Sorokin. In effect, he seems to have filled in many of the gaps left by the studies of Vico and Spengler.

Pitirim A. Sorokin: Background and Its
Influence on His View on Culture

Pitirim Alexandrovich Sorokin was born in Russia in 1889 (Cowell, 1970). By 1906 Sorokin was caught up in the revolutionary forces that were sweeping Russia. He became an important figure in the Socialist Revolutionary party and was arrested by the Czar's forces by the time he was eighteen (Cowell, 1970). Sorokin was a graduate of the University at St. Petersburg (later named Leningrad) and evidently was an honor student there (Allen, 1963). He became a lecturer at the university and was lecturing there when World War I began (Cowell, 1970).

The Russian Revolution of 1917 made Sorokin weary of the more radical forces in Russian Society. He spoke in favor of moderation and was seen as a potential enemy of the radical Bolshevik cause (Cowell, 1970). Sorokin (1950) was to refer to Zinovieff, the leader in the Bolshevik cause as, "a disgusting creature. In his high womanish voice, his face, his fat figure, there is something hideous and obscene, an extraordinary moral and mental degenerate" (Sorokin, 1942). Needless to say, Sorokin did not endear himself to the Bolshevik cause. He found himself in a dreary prison cell by 1918 (Cowell, 1970). After a brief period of reprieve, Sorokin was forced into exile (Cowell, 1970). He became even better

known as a writer while in Berlin and Prague, and was invited to lecture in the United States in 1923 (Cowell, 1970). He would eventually become of Professor of Sociology at the Universities of Minnesota and Harvard. Many have referred to him as the father of sociology in the United States (Allen, 1963).

Sorokin's background in Russia was one of chaos and even terror (his years in Soviet prisons are described by Cowell (1970) as pure hell). These formative years would seem to be very important when attempting to view Sorokin's concept of culture. Sorokin, writing of his life experiences states:

Eventfulness has possibly been the most significant feature of my life adventure. In a span of seventy-three years I have passed through several cultural atmospheres: pastoral-hunter's culture of the Komi; first the agricultural, then the urban culture of Russia and Europe; and finally, the megalopolitan, technological culture of the United States. (Cowell, 1970, p. 7)

He later writes of his "life experiences":

Besides joys and sorrows, successes and failures of normal human life, I have lived through six imprisonments; and I have had the unforgettable experience of being condemned to death and daily during six weeks, expecting execution by a

communist firing squad. (Cowell, 1970, p. 7)

As one examines Sorokin's concept of culture there is a feeling that his own life and his philosophy seem to mirror one another.

Sorokin's Concept of Culture

In 1937, Sorokin published the first three volumes of Social and Cultural Dynamics (he would eventually add a fourth volume). In this massive work Sorokin laid forth his views on culture. He was to put forth a detailed analysis of culture. Cowell (1952) writes:

He sought to analyze in more detail the nature of a true system of culture, of what he calls a socio-cultural system or supersystem; to distinguish it from mere chance mixtures of an unsystematic, unrelated kind that he describes a socio-cultural congeries, as well as from miscellaneous collections of cultural systems.

(p. 212)

Sorokin viewed cultural systems as complex in nature, and not given to simple descriptions (Sorokin, 1947).

Sorokin implies that for any culture to be understood, all of its various components must be examined (Sorokin, 1950). Its arts, language, religion, etc. must be studied. Limited atomistic approaches lead to fragmented results with little meaning (Sorokin, 1947).

Sorokin sees culture existing as an entity that functions in a unified way. Sorokin (1950) states:

It is not identical with the nation or any other social group. Ordinarily the boundaries of this cultural entity transcend the geographical boundaries of national or political or religious groups. (p. 275)

By viewing cultures as separate entities, not bound up entirely without political and geographic forces, Sorokin is able to speak of Western culture in a much less narrow sense than many of his predecessors had.

Sorokin (1947) states that each cultural system is based upon certain premises or beliefs. He sees these beliefs as being the defining characteristics of a particular cultural system (Sorokin, 1947). These beliefs are those which relate to the human. They are not seeking to apply them to plant and animal life (Cowell, 1952). Thus, anything that men consider important or of use has value within the context of the cultural system (Cowell, 1952).

Sorokin does not view cultural systems as eternal. In fact, he sees them as being subject to the laws of change, as with other living things (Sorokin, 1947). Here he takes on a view of an organic culture, similar to the views of Spengler. Furthermore, by approaching culture in this way he has presented a way of viewing

culture as distinct from that of civilizations. Cowell (1952) states:

...it gives a much deeper meaning to the idea of civilization, as that word has commonly been used. For the study of successive cultural patterns shows up clearly the danger of speaking and writing about civilizations...as though they were some easily identifiable, single, individual thing. (p. 9)

This view of culture implies that Greek civilizations or Roman civilization could have had several different cultural systems come and go within the bounds of such a time period.

Sorokin emphasized that culture possesses a unity of its own (Cowell, 1952). All the parts of the culture therefore contribute to its meaning. As Cowell (1952) states:

A true culture must possess a unity of its own from which the meaning of all its various parts or components is derived and to which they all contribute. Far from economics being able to explain the whole of culture therefore, it is the form and nature of the dominant culture that determines the economic pattern of life within the culture. (p. 10)

By insisting that culture be viewed as a unified

meaningful whole, Sorokin is rejecting the linear concepts dominant in the social sciences. By viewing cultures from a holistic perspective, he sets the stage by which cultures can be viewed as subject to change, even destruction. Individuals count in his cultural scheme, but it is the whole of the cultural mesh that determines its direction.

Sorokin's view of culture asks us to see society in all of its complexities. Love, principles, ethics, art; in short, all of the complexities of life are to be examined. After having established his concept of culture, Sorokin turned to the question of how and why cultures change.

Sorokin's Concept of Cultural Transformation

In his massive work, Social and Cultural Dynamics (1937), Sorokin discussed how cultures change and why they change (Cowell, 1952). Despite the complex view of culture laid forth by Sorokin, he does believe that it is possible to detect order and patterns in these cultures (Sorokin, 1950). Sorokin's views countered those who found no cultural uniformities (Cowell, 1952). To Sorokin there is much to be gained by tracing the patterns of cultural development.

Since Sorokin established that cultures tend to exist

as wholes, but with subsystems operating within the dominant (supersystem), he was faced with answering the question of whether cultures change as a whole or atomistically (Cowell, 1952). Sorokin answers this by referring to closely integrated and nonclosely integrated systems. By integrated, Sorokin is referring to a cultural system that is very coherent (unified) in its ideological beliefs (Sorokin, 1947). He describes such an integrated system as follows:

When in any given universe of ideological systems we find the vastest combined system of ideology, that integrates into one consistent unity most of the essential scientific (including the economic, political, social, and humanistic sciences), philosophical, religious, aesthetic, juridical, ethical, and technological systems; in which all these articulate the same basic meanings, values, and norms, we have the vastest ideological supersystem possible in a given universe of ideological systems. The articulated basic ideas and values make up its major premise. (Sorokin, 1947, p. 319)

Such a closely integrated system changes as a whole, according to Sorokin (Cowell, 1952). The greater the integration and inter-dependence of the system, the greater the chances are of a cultural transformation

taking place as a "togetherness" (Cowell, 1952). Conversely, a non-closely integrated system will see only those aspects of the culture which are most important change together (Cowell, 1952). It is important to note that even in a non-integrated system, change does still occur. The non-integrated aspects of the culture simply change at a slower rate (Sorokin, 1947).

To explain why cultures change, Sorokin presented a concept known as the Principle of Immanent Change. This principle explains that the dominant cultural system practices activities generally designed to foster the ongoing existence of that particular culture. Eventually the system begins to wear itself out. As Cowell (1970) states:

The continued practice of activities directed to any one end, noble as it may be, is more than humanity has been able to stand. Some values once honored begin to lose their appeal; responses become stereotyped and unreal. Almost all human experience testifies to such a development. (p. 47)

Thus to Sorokin, change need not be immediate. It can be very gradual, but it is built into any cultural system.

Sorokin also sought to discover whether cultural changes take place in a rhythm or cyclical fashion (Cowell, 1952). Sorokin made use of several theories

relating to rhythm. He identified the Chinese concept of Yin and Yang and certain Hindu concepts of rhythm (Cowell, 1952). He also points out that such thinkers as Confucius, Plato, Aristotle, Vico, Descartes, etc. established the reality of rhythmical change (Cowell, 1952). Sorokin's intense studies led him to conclude that rhythmic change takes place in a three-phase rhythm. That he describes as the rhythm of Ideational, Idealistic, and Sensate cultures. He applied that rhythmic scheme to Western culture and did not seek to apply it to all other cultural schemes.

Sorokin's Ideational, Sensate, and Idealistic Cultures

Sorokin identified three broad systems of Western culture, which he saw as being subject to rhythmic change (Sorokin, 1947). He described these systems as the Ideational, Sensate, and Idealistic. He sought to describe these systems in terms of their relation to all aspects of culture. He examined the art, philosophy, religion, music, etc. of Western culture. But this examination is best clarified through what Sorokin classifies as systems of truth. In other words, all aspects of culture can be examined through the Ideational, Sensate, and Idealistic systems of truth.

Sorokin described Ideational truth as the truth of

faith (Sorokin, 1947). He describes such a trust system as follows:

Ideational truth is indeed the truth revealed by the grace of God through his mouthpieces (the prophets, mystics, oracles, and founders of religion), disclosed in a supersensory way through mystic experience, direct revelation, divine intuition, and inspiration. (p. 607)

Sorokin's Ideational truth system thus rejects the empirical basis for establishing truth. Sorokin (1947) states:

Since according to the major premise, sensory reality and values are not the true reality and values, the Ideational system of truth is little interested in the study of the physical, chemical, and biological properties of the empirical world. (p. 607)

Consequently, a society basing its philosophy, arts, etc. upon such a system of truth, is not concerned with scientific discoveries (technological inventions). Instead, the Ideational system of truth turns for inspiration to the non-material world. Sorokin refers to this as the supersensory world (Sorokin, 1941).

An Ideational system does come to terms with the sensory world. It does not reject its existence. The wealth and pleasures of the sensory world were, however,

to be viewed with indifference (Sorokin, 1941). Sorokin explains:

The sensory world was considered a mere temporary "city of man" in which a Christian was but a pilgrim aspiring to reach the eternal City of God and seeking to render himself worthy to enter it. In brief, the integrated part of this culture was not a conglomeration of various cultural objects, phenomena, and values, but a unified system--a whole whose parts articulate the same principle of true reality and value: an infinite, super-sensory, and super-rational God, omnipresent, omnipotent, omniscient, absolutely just, good, and beautiful, creator of the world and man. (p. 19)

Sorokin has painted a picture of the members of an Ideational culture as contemplators. There are men and women who rely on spiritual strength for guidance. The Ideational system rejects that which is only temporary (i.e. material possessions), and aspires to eternal truths and values (Allen, 1963). Sorokin describes the supreme goal as the union with the absolute (Allen, 1963).

Historical periods associated with the Ideational mentality can be directly associated with highly religious societies. Conversely, one would see no growth, or

even a decline in scientific advances with such a system (Allen, 1963). Sorokin was able to associate the Ideational mentally not only with Western culture, but with aspects of the Brahmanic culture of India, the Buddhist and Taoist cultures (of India and China), and even in Greek culture (for the Greeks he sees evidence of an ideational mentality between the eighth and sixth centuries B.C. (Sorokin, 1941). According to Sorokin, the ideational mentality of Western man began to decline during the medieval period.

Sorokin dates the decline of the Ideational system in medieval culture near the end of the twelfth century (Sorokin, 1941). After which, there emerged a new system which he described as the Idealistic system of truth. An Idealistic system of truth can be described as being logically and organically integrated (Allen, 1963). It is a mixed cultural system integrating aspects of the Ideational system with that of the sensory world. Sorokin (1947) describes the Idealistic system as follows:

As a synthesis of sensory, rational, and super-sensory truth the Idealistic system of truth recognizes the role of the sense organs and of reason as the source and criterion of the validity or invalidity of a proposition concerning sensory and rational phenomena. In regards

to supersensory phenomena it claims that any knowledge of these is impossible through sensory experience and is obtained only through the direct revelation of God. Human reason combines into one organic whole the truth of senses, the truth of faith, and the truth of reason. (p. 610)

Sorokin's Idealistic culture is one of harmony and wholeness. The Idealistic culture seeks its values in both the spiritual and materialistic worlds (Cowell, 1952). It brings to us a picture of people using the material world (sensory) to help humanity seek its fullest potential with science and spirituality working hand in hand. A holistic picture is seen, in which the two cannot be separated; they are aspects of the same thing.

By describing this Idealistic culture or Integral culture as he sometimes calls it, as a blend of past and present cultural values, Sorokin is rejecting the strict linear view of culture. Strict empiricism is dealt a blow by such a cultural system. Sorokin (1937) states:

Its ultimate principle proclaims that the true reality-value is an Infinite Manifold which has supersensory, rational, and sensory forms inseparable from one another...it includes the empirical as well as the super empirical aspects of reality, science as well as philosophy and theology. (Oliver, 1989, p. 28)

The Integral system described by Sorokin is not closed to one dominant category of knowing. Truth is defined through a variety of mediums. Philosophy takes its place as a source of truth, existing simultaneously with scientific progress. Religion is still very much a part of the cultural scheme. The Sensate world exists to promote the human spirit in the best ways possible (Cowell, 1952). In short, the purpose of an Idealistic culture is to promote spiritual development, not hinder it.

The Idealistic blend would seem to be the logical outcome of cultural progression, the stopping point of cultural progression. But Sorokin tells us that this is not the case. He identifies the cultures of the thirteenth and fourteenth centuries in Europe as predominately Idealistic (Sorokin, 1941). He contends that between the fifteenth and seventeenth centuries a new culture began to develop in the Western world to replace the Idealistic cultural scheme (Sorokin, 1941).

He states:

The Ideational culture of the Middle Ages continued to decline, whereas the culture based upon the premise that true reality and value are sensory continued to gather momentum during the subsequent centuries. Beginning roughly with the sixteenth century the new principle became dominant; and with it the new form of culture

that was based upon it. (p. 20)

This Sensate culture, according to Sorokin is dominated by sensory perception (Sorokin, 1947). Sensate truth is determined by the sense organs (Sorokin, 1947, p. 610). Sorokin (1947) states:

In this system of truth the sense organs become the principal source of cognition of sensory reality; their testimony decides what is true and what is false; they become the supreme arbiters of the validity of any experience and proposition. Another name for this truth of the senses is empiricism. (p. 610)

Empiricism (Sensate truth) can then be directly linked to the Scientific Revolution of the sixteenth century. Sorokin finds the philosophy of John Locke to be the personification of such a Sensate system (Sorokin, 1947). For Locke's statement that there is, "nothing in the mind that was not already in the Sense," is to Sorokin the exact formula needed for the development of a Sensate culture (Sorokin, 1947).

Sorokin identifies other aspects of the Sensate system of truth. In fact, his descriptions of the sensate system often are more defined than those he gives to the Ideational and Idealistic cultures. Perhaps these descriptions are fuller due to the fact that he has identified modern Western culture with the Sensate cul-

tural system (Allen, 1963). Sorokin (1947) includes the following descriptions in his discussion of the Sensate system:

1. Any system of Sensate truth and reality implies a denial of, or an utterly indifferent attitude toward, any supersensory reality or value. (Sorokin, 1947, p. 610).

The Sensate system of truth denies the ability to know that which is purely metaphysical. The metaphysical is either denied in total or relegated to the unknowable. Sorokin (1947) identifies Kant's criticism, agnosticism, and positivism as examples of Sensate truth at work.

2. If the Sensate system disfavors any preoccupation with the supersensory aspects of reality, it most strongly favors the study of the sensory world, with its physical, chemical and biological properties and relationships. (Sorokin, 1947, pp. 610-611)

Here Sorokin tells us that in a Sensate system of truth science becomes the measure of what is true. To study the sciences is to become knowledgeable. The study of theology is replaced by the study of natural science (Sorokin, 1947). Sorokin cites the proliferation of scientific discoveries in the eighteenth-twentieth centu-

ries as evidence of the preoccupation with natural science (Sorokin, 1947). All cultures which are associated with a Sensate system of culture see an increase in scientific discoveries. As evidence Sorokin cites aspects of a Sensate culture in certain ancient cultures (Sorokin, 1947).

3. Sensate truth, or empiricism, as we have seen, rejects any revealed super-sensory truth. It discredits also, to a certain extent, reason and logic as the sources of truth until their deductions are corroborated by the testimony of the sense organs...Therefore in Sensate cultures and societies the empirical systems of philosophy based upon Ideational or Idealistic truths decline.
(Sorokin, 1947, p. 611)

Sorokin is no doubt referring here to the growth of skeptical philosophy as promoted by Locke (1690) and later by such men as David Hume (1711) and Bertrand Russell (1949). He sees the movement of Ideational and Idealistic art and philosophy moving in the opposite direct of the prevailing Sensate system (Sorokin, 1949). Sorokin, writing in 1947, saw the Sensate system of truth having greatly proliferated in the first half of the twentieth century (Sorokin, 1947).

4. A fully developed Sensate system of truth and cognition is inevitably "materialistic", viewing everything, openly or covertly, in its materialistic aspects. ...Hence the general tendency of the sensate mentality to regard the world--even man, his culture and consciousness itself--materialistically, mechanistically, behavioristically. (Sorokin, 1947, p. 611)

Sorokin contends that the scientific world has created a culture oriented almost entirely to the materialistic world. Man, he states, "by scientific definition becomes a complex of electrons and protons" (p. 613). Sorokin believes that the medieval period between 500 and 1300 was almost entirely devoid of materialistic concerns, while the periods following 1300 show a measured increase in materialistic concerns (Sorokin, 1947). Correspondingly, idealism declined in direct proportion to materialism, according to Sorokin's studies.

5. A further consequence of such a system of truth is the development of a temporalistic, relativistic, and nihilistic mentality. The sensate world is in a state of incessant flux and becoming. There is nothing unchangeable in it, not

even an eternal Supreme Being. (Sorokin, 1947, p. 610)

Sorokin cites the tendency of Sensate cultures to live in the present. The past has little meaning. Progress (linear development) is the focus. Sorokin quotes the latin phrase *Carpe Diem*, "seize the day", as being symbolic of the Sensate culture (Sorokin, 1947). Getting rich quick and opportunity for one's self take precedence over meditative plans. The future is too uncertain to contemplate. Thus, the present is real and worth dealing with (Sorokin, 1947).

6. From the same system of truth and values follows the doctrine of relativism. Since everything is temporal and subject to incessant change, and since sensory perception differs in the case of different organisms, individuals, and groups, nothing absolute exists. Everything becomes relative--truth and error, moral and aesthetic considerations, and what not. (Sorokin, 1947, p. 614)

Sorokin states that relativism grows in direct proportion to sensate development. Eventually the relativistic outlook becomes so uncompromising that everything can be considered relativized (Sorokin, 1947). But Sorokin adds

that relativism eventually gives way to complete scepticism, cynicism, and nihilism (Sorokin, 1941).

Eventually, according to Sorokin, society under such a relativistic scheme, will either perish or turn to another system of truth (Sorokin, 1947). (Since truth has essentially been replaced by complete relativism.)

7. All this means that sensory truth, when made exclusive, inevitably develops into a kind of illusionism...Decadent sensory science even declares that is not concerned with any true reality. In this way sensory truth eventually digs its own grave. (Sorokin, 1947, p. 614)

Sorokin appears to be speaking to philosophical concerns when he speaks of Sensate illusionism. Sensate culture is unable to focus on real human concerns. Sorokin believes that in place of human concerns artificial constructs (i.e. scientific principles) become the norm (Sorokin, 1947). Thus humanity (human concerns) is not really knowable.

8. The same system of truth gives rise to the nominalistic and singularistic mentalities characteristic of sensate society. Sensory perceptions are always singularistic...Such a mentality regards society as simply a sum of interacting

individuals. It cannot see the forest
for the trees. (Sorokin, 1947, p. 614)

Sorokin's view of Sensate culture is that of a culture which does not maintain a holistic perspective. Sensate culture is atomistic in its approach (corresponding to Newtonian logic). Universalism is decided in Sensate culture as, "the product of unscientific minds" (Sorokin, 1947). Such a culture emphasized individual concerns more than society as a whole.

9. Finally, sensate science, philosophy, pseudo-religion, and ethics are utilitarian, hedonistic, pragmatic, operational, and instrumental. Science and philosophy come to be imbued with utilitarian aims. Only those disciplines which, like physics and chemistry, biology and medicine, geology, and geography, technology, politics and economics, are eminently practical and serviceable are intensively cultivated.
(Sorokin, 1947, p. 614)

Sorokin tells us that metaphysical philosophy has no place in the Sensate culture. In fact, metaphysics tends to be ignored entirely within a Sensate culture (Sorokin, 1947). Control, utilitarian control, becomes the prime motivator within the Sensate culture. Sorokin specifi-

cally uses the schools as an example of how the sensate system of thought develops. Our schools have become preoccupied with "useful knowledge", according to Sorokin (Sorokin, 1947). Real knowledge, wisdom as described by Sorokin, is secondary to utilitarian concerns (Sorokin, 1947, p. 615).

Sorokin's detailed descriptions of the Sensate culture reveal his contention that culture is in transition (Oliver, 1989). Sorokin contends that to understand cultural transformation the three main forms of culture must not be viewed in isolation from one another (Oliver, 1989). Sorokin believes it is essential to be able to contrast these cultural systems (Sorokin, 1947).

Contrast of the Ideational and Sensate Culture

As stated above, Sorokin believes that it is extremely important to be able to contrast the differences between the three cultural supersystems. Especially between the ideational and sensate cultures (Sorokin, 1947). He believes this contrasting helps to explain the development (and eventual dominance) of one cultural system over another. He states:

What appears true from the standpoint of Ideational truth is ignorance and superstition from

the standpoint of Sensate truth, and vice versa.

Many a revealed truth of religion is utterly false from the point of view of an exclusive truth of the senses, and vice versa. (Sorokin, 1947, p. 615)

Sorokin's explanations of philosophy tend to support the notion of the exclusion of one system's truths over another. The efforts of the Logical Positivists in the twentieth century to reduce all philosophy to mathematical (Sensate) concepts would seem to be an example of this exclusion process at work.

Sorokin cites the decline of religion as an example of the contrast of the Ideational and Sensate cultural systems. He believes that sensory truth, as it has developed, tends to view the Christian concepts of truth, faith, and revelation as mere superstition (Sorokin, 1947). However, the Christian faith would view mere sense perception as ephemeral and not worthy of our time or effort.

The contrasting of the systems of truth also serves to support Sorokin's contention that cultural systems are not linear. By showing the contrasts that have developed over the centuries, Sorokin believes that oscillation, rather than linearity, is the way of cultural systems (Sorokin, 1941). Sorokin sought to contrast the development of the systems of truth through exhaustive

quantitative methods. His extensive use of charts, graphs, and comparative studies tended to lend credibility to his cultural theories (Allen, 1963).

Sorokin's Methods of Research

Sorokin's methods of research included an exhaustive look into the nature and development of ethical systems (Cowell, 1970). To do so Sorokin surveyed the philosophies of hundreds of historical figures to formulate his thesis. To demonstrate the philosophical division between determinism and indeterminism Sorokin created tables reflecting the shifts in these viewpoints between 540 B.C. and A.D. 1920. Sorokin, in these instances used rating scales from one to twelve to demonstrate the degree to which a deterministic or indeterminate view was associated with a particular individual. Sorokin was aware that some writers/philosophers were not easily placed in a particular category. In these instances Sorokin simply does not include them in his tables (Cowell, 1970). Tables III and IV (on following pages) demonstrate how Sorokin sought to measure the eras of history which reflect a drop or change to determinism or indeterminism. Note: The larger numbers represent those who would rate higher on the scale. For instance, Plato with a 12 rating would be said to have viewpoints which are highly deterministic and Wycliff

with a 3 would be said to be less deterministic in his outlook.

TABLE III
SOROKIN'S SURVEY OF DETERMINIST AUTHORS

Author		Author		Author	
Pythagoras	8	Heraclitus	7	Panaetius	5
Plato	12	Zeno	8	Varro	5
Cicero	8	N. Figulus	4	Epictetus	6
Plutarch	8	M. Aurelius	6	Luther	8
Wycliffe	3	L. da Vinci	8	Calvin	6
Zwingli	6	Melanchthon	5	Kepler	8
G. Bruno	8	Bacon	7	Hobbes	8
Galileo	8	Jansen	6	Pascal	7
Guelinex	6	Spinoza	8	Malebranche	7
Mandeville	4	Hume	8	Voltaire	7
Helvetius	6	Holback	6	Priestley	6
Diderot	7	Kant	12	Bentham	6
J. Mill	6	A. Comte	8	Spencer	8
K. Marx	8	Engels	6	Tolstoy	8
Bradley	7	Democritus	8		

Table III represents Sorokin's survey of philosophers and writers whom he determined to be deterministic in their philosophy.

Table IV demonstrates Sorokin's list of writers and philosophers from 580 B.C. to 1920 whom he determined to have an indeterminate bent.

Sorokin was careful to point out that some writers have intentionally presented both deterministic and indeterminate views (Cowell, 1970). Kant is an example of a writer who espoused the two views. In particular,

TABLE IV
SOROKIN'S SURVEY OF INDETERMINIST AUTHORS

Author		Author		Author	
Aristotle	12	Grosseteste	4	Glisson	3
Theophrastus	7	A. Magnus	8	Berkeley	8
Epicurus	8	St. Thomas	12	Kant	12
Lucretius	8	Aquinas		Vico	7
P. Judaeus	8	R. Lully	5	J. Edwards	6
J. Martyr	5	M. Eckhart	8	Rousseau	8
Apuleius	6	Dante	8	Condillac	6
Origen	8	Gerson	4	Fichte	8
Tertullian	6	Nicolas of	8	Schiller	8
Plotinus	12	Crusa		Herder	6
Porphyry	7	Erasmus	5	Goethe	8
St. Basil	6	Loyola	8	Whewell	6
St. Augustine	10	Cardan	6	Schelling	8
Gregory I.	4	Campanella	6	Carlyle	4
M. Confessor	6	Gassendi	7	Lotze	5
Alcuin	4	Descartes	8	Hartmann	8
St. Anselm	7	Cudworth	5	Dostoevsky	7
St. Bernard	5	Leibniz	9	J.S. Mill	8
Abelard	4	Malebranche	7	Rickert	6
P. Lombard	4	R. Boyle	4	W. James	4
John of	3	Locke	8	L. Stephen	7
Salisbury		H. More	4		
		Bossuet	6		

Kant's In Critique of Pure Reason, is a classic example of the dualism that Sorokin points to. In both the determinism and indeterminism lists Kant receives the highest rating of 12.

Table V represents the result of Sorokin's combining the tables of determinism and indeterminism to show the incidents of each in various time periods.

TABLE V
SOROKIN'S HISTORICAL PERIODS OF
DETERMINISM AND INDETERMINISM

Period	Determinism	Indeterminism
580 B.C.-A.D. 100	678	212
A.D. 100-540	239	557
540-1500	73	519
1500-1920	1302	1339

Sorokin's attempts to analyze the literature of such a broad expanse of time represent a monumental task. However, by demonstrating how each time period produced writers of the deterministic and indeterministic modes, he gives us a way of visualizing his thesis of cultural flow. Interestingly, the period between 1500 and 1920 shows the forces of determinism and indeterminism having

reached a near balance. Sorokin (1950) indicates that the last quarter of the nineteenth century and the early twentieth century have accounted for a shift from determinism to a more indeterminate view.

Figure 1, shown below, represents Sorokin's attempt to chart the period from 580 B.C. to 1900.

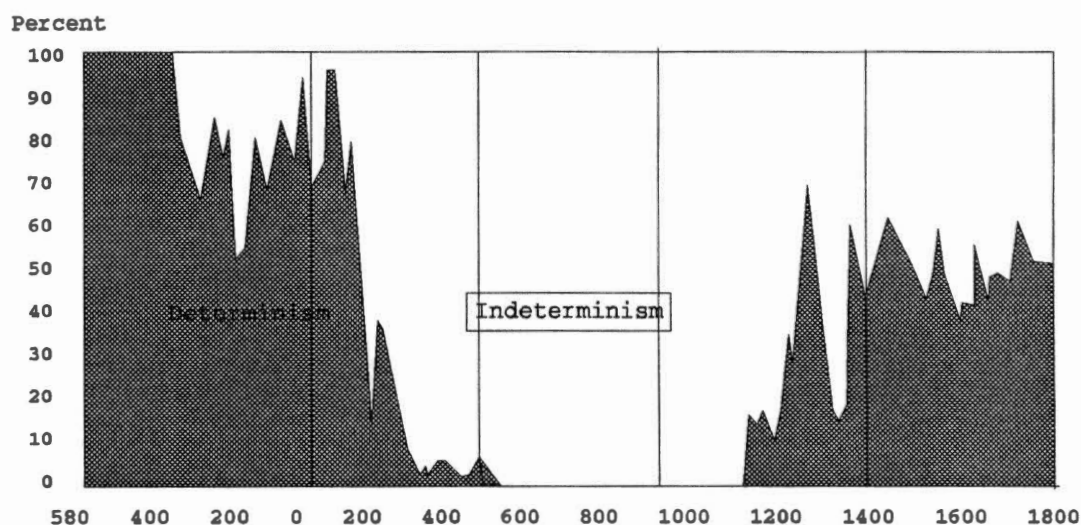


Figure 1. Sorokin's Chart of Deterministic and Indeterministic Philosophies, 580 B.C. to 1900 A.D.

Sorokin's chart indicates that a mix of deterministic and indeterminate philosophies become more pronounced by the beginning of the 1900's. The fluctuations between 1200 and 1900 are interesting to note.

Sorokin (1941) attempted to survey all major historical persons from the period 950 B.C. to 1849. His research was drawn from The Encyclopedia Britannica published in 1875.

A careful survey of Tables VI and VII (shown on the following pages), indicate that in each time period the Ideational, Mixed, and Sensate cultures coexist (Cowell, 1952). Cowell (1952) states the following regarding the Britannica tables:

This empirical study was made independently unaware of the main conclusions to which Sorokin's other work was pointing. It provides historical evidence that there is an association between the type of dominant culture and the frequency of the type of conduct and personality. (p. 211)

Smith (1963) also agrees with Cowell's assessment of the validity of Sorokin's historical studies. Certainly, Sorokin cannot be faulted by being too superficial. The Britannica work alone is voluminous.

TABLE VI
GEOMETRIC AVERAGES FOR TYPES OF
HISTORICAL PERSONS
950 TO 1 B.C.

	Ideational		Mixed		Sensate	
PERIOD	Number	Percent	Number	Percent	Number	Percent
950-901	0	0	0	0	17.9	100
900-851	13.7	12	0	0	102.7	88
850-801	0	0	18.0	100	0	0
800-751	21.6	53	0	0	19.2	47
750-701	53.4	76	11.8	17	5.2	7
700-651	9.8	34	11.1	38	7.9	28
650-601	21.5	22	35.6	37	38.6	41
600-551	69.6	38	61.0	34	50.7	28
550-501	120.4	40	67.5	22	114.2	38
500-451	124.6	37	107.6	33	100.9	30
450-401	68.6	11	228.9	38	306.2	51
400-351	79.6	13	326.0	56	180.7	31
350-301	43.2	7	279.9	45	290.1	48
300-251	33.1	12	192.1	70	59.7	18
250-201	12.6	5	85.3	35	148.1	60
200-151	12.5	5	96.3	39	145.1	56
150-101	0	0	43.6	45	51.8	55
100-51	16.9	4	112.4	24	333.8	72
50-1	69.4	11	224.2	35	339.1	54

TABLE VII
GEOMETRIC AVERAGES FOR TYPES OF
HISTORICAL PERSONS
1 TO 1849 A.D.

PERIOD	Ideational		Mixed		Sensate	
	Number	Percent	Number	Percent	Number	Percent
0-49	179.9	31	119.3	21	272.9	48
50-99	46.0	9	219.2	43	240.7	48
100-149	100.0	26	208.4	55	72.0	19
150-199	23.7	7	238.4	76	54.7	17
200-249	121.5	43	133.5	47	29.8	10
250-299	102.7	56	32.8	18	46.9	26
300-349	78.0	23	126.2	37	139.0	40
350-399	204.7	40	190.2	38	111.7	32
400-449	80.4	22	165.2	45	123.7	33
450-499	22.8	11	113.4	52	80.4	37
500-549	77.9	28	84.6	30	115.9	42
550-599	45.6	30	58.6	39	48.0	31
600-649	58.5	40	45.2	31	42.2	29
650-699	29.6	45	19.0	29	17.2	26
700-749	43.1	44	15.3	16	38.7	40
750-799	33.8	48	12.6	18	23.6	34
800-849	57.0	36	74.1	47	26.3	17
850-899	91.0	37	76.6	31	76.8	32
900-949	16.8	14	51.7	42	54.5	44
950-999	18.1	10	75.6	42	87.2	48
1000-1049	38.2	15	75.0	29	148.5	56
1050-1099	24.4	6	145.6	37	218.7	57
1100-1149	72.5	17	176.6	41	177.3	42
1150-1199	74.8	15	210.9	41	228.0	44
1200-1249	66.1	15	166.9	36	231.3	49
1250-1299	172.0	33	185.9	35	167.0	32
1300-1349	91.4	26	181.7	51	81.2	23
1350-1399	144.6	23	152.5	24	330.4	53
1400-1449	141.4	18	322.7	42	302.1	40
1450-1499	240.9	15	602.1	38	730.9	47
1500-1549	543.4	17	1037.5	33	1543.1	50
1550-1599	485.9	14	1429.7	41	1528.1	45
1600-1649	537.0	12	1861.5	42	2023.5	46
1650-1699	949.4	19	1641.8	34	2179.0	47
1700-1749	724.0	17	2014.4	44	1534.0	39
1750-1799	901.6	10	3566.6	41	4329.9	49
1800-1849	1460.0	9	7301.1	50	5870.5	41

Regarding the historical work centering on the Brittannica study, Cowell (1952) makes the following conclusions shown in Table VIII below:

TABLE VIII
COWELL'S CONCLUSIONS FROM
BRITTANICA STUDY

Years	Conclusions
800-801 B.C.	represents a transitional period
800-500 B.C.	shows a notable increase in the percentage of ideational types
500-451 B.C.	is in a near balance
450-A.D. 1	shows extensive change with ideational culture in decline
A.D. 1 - 249	indicates transition to the ideational
A.D. 250 - 899	ideational types prevail
A.D. 900 - 1399	ideational types are in decline

Based on his study of historical characters, cultures have been in a state of change and do tend to move in periods of from two to four hundred years. Combining Sorokin's tables regarding determinism and indeterminism

with the Britannica study we are able to trace these developments. Based on these studies, Sorokin (1950) indicated that the last half of the twentieth century would see a definite rise in the influence of Ideational types. Sorokin (1950) was then able to forecast a decline in the dominant Sensate culture, which he believed had dominated the Western world since the Age of Enlightenment.

Sorokin (1947) also sought to demonstrate the fluctuations in patterns of happiness and ethics. His ethics of happiness, which Sorokin describes as wealth, pleasure, and utility, are associated with sensory perceptions, and thus associated with a Sensate culture. His absolute ethics, which Sorokin identifies with religious principles, is associated with Ideational cultures (Sorokin, 1947). Table IX, shown on the following page, demonstrates Sorokin's plotting of the trends of Sensate ethics of happiness and Absolute-Ideational ethics from 400 A.D. to 1920.

Sorokin demonstrates that the Sensate system of ethics has never completely dominated. Conversely, the absolute Ideational ethics system maintained a dominant position throughout most of the time period from 400 A.D. to 1920. The period 1900-1920 indicates the most balance

TABLE IX
FLUCTUATIONS OF SENSATE AND
IDEATIONAL ETHICS

Period	Sensate Ethics of Happiness (Percentage)	Absolute Ideational Ethics (Percentage)
400-500	0	100
500-600	0	100
600-700	0	100
700-800	0	100
800-900	0	100
900-1000	0	100
1000-1100	0	100
1100-1200	0	100
1200-1300	0	100
1300-1400	0	100
1400-1500	8.7	91.3
1500-1600	43.5	56.5
1600-1700	38.4	61.6
1700-1800	36.3	63.7
1800-1900	38.0	63.0
1900-1920	43.0	57.0

in the two ethical systems. Sorokin (1947) sees this shift towards Sensate ethics as indicative of the trend in modern history away from the commitment to religious principles and towards materialism. He states:

Early and medieval Christianity had denounced wealth as the source of perdition; money making, as *summae periculosae*; profit, as a *turpe lucrum*; money lending, as a grave crime; the rich man, as the first candidate for perdition...it was more

difficult for a rich man to enter the Kingdom of God than for a camel to go through the eye of a needle. Now the Reformation and the Renaissance made an about face. On Sundays he [the Puritan] believes in God and Eternity; on weekdays in the stock exchange. (p. 622)

Sorokin believed that the growth of paganism, capitalism, utilitarianism, crime, and even Protestantism accompanied the growth of Sensate ethics (Sorokin, 1947). His research indicates that Sensate ethics have played a dominant role in society since the sixteenth century.

Allen (1963) and Cowell (1970), have praised the thoroughness of Sorokin's research. Sorokin's numerous categories of research have perhaps contributed to his acceptance among other sociologists/historians.

Sorokin's General Thesis

Sorokin's research led him to believe that the Sensate system of ethics had reached its peak in the mid-nineteenth century. He also believes that the dominant Sensate culture is in a state of decline. Sorokin (1941) states:

Every important aspect of the life, organization, and the culture of Western society is in the extraordinary crisis...Its body and mind are sick and there is hardly a spot on its body which

is not sore, nor any nervous fiber which functions soundly...We are seemingly between two epochs: the dying Sensate culture of our magnificent yesterday and the coming Ideational culture of the creative tomorrow. We are living, thinking, and acting at the end of a brilliant six-hundred-year-long Sensate day. The oblique rays of the sun still illuminate the glory of the passing epoch. But the light is fading, and in the deepening shadows it becomes more and more difficult to see clearly and to orient ourselves safely in the confusions of the twilight. The night of the transitory period begins to loom before us, with its nightmares, frightening shadows, and heartrending horrors. Beyond it, however, the dawn of a new great Ideational culture is probably waiting to greet the men of the future. (p. 13)

Sorokin's thesis is then both pessimistic and optimistic. Transition is inevitable and we are to experience some upheaval as the Sensate culture fades away. Sorokin (1942) states:

Wars and revolutions are not to disappear in the twentieth century but will grow in the twentieth century to an absolutely unprecedented height, looming more imminent and more formidable than

ever before; that democracies were declining, giving place to various kinds of despotisms; that the creative forces of Western culture were withering and drying up. (pp. 13-14)

This upheaval has certainly come to pass. Johnson (1983) estimates that over one-hundred-twenty million people have perished as a direct result of the wars of the twentieth century. Sorokin's thesis, to our horror, has become a reality. But it is important to consider the optimistic aspects of his general thesis. The Sensate culture is to give way to an Ideational culture that will hold new promise for the human race. These opportunities will not mean the swapping of one ideology for another; but something far more profound. The new culture will represent a change in mankind's fundamental attitudes (Sorokin, 1942).

Since the transition is inevitable, Sorokin implies that the establishment will fight to retain their position (Sorokin, 1942). He states:

It is a crisis in their art and science, philosophy and religion, law and morals, manners and mores; in the forms of social, political, and economic organization, including the nature of the family and marriage--in brief, it is a crisis involving almost the whole way of life, thought, and conduct of Western society. More precisely,

it consists in a disintegration of a fundamental form of Western culture and society dominant for the last four centuries. (p. 17)

The resistance of certain elements of society to the transition from a Sensate culture becomes one of the dominant themes in Sorokin's thesis. Sorokin sees this as quite natural. These elements find their very way in life at stake (Sorokin, 1947). Current cries for the continuation of Western traditions in unadulterated forms could be construed to be signs of the fight to save a dying Sensate culture.

Sorokin (1942) predicted a rise in crime, divorce rates, robbery and a myriad of other calamities as the transition takes place. Capra (1982), Ferguson (1980), Glieck (1987) all have projected that current upheavals in society are representative of a culture in the midst of dramatic change. Their contentions tend to lend support to Sorokin's general thesis.

Implications of Sorokin's Theory

Sorokin's work coincides with that of Vico and Spengler. Both Vico and Spengler predicted that Western culture was in a state of flux. Change, according to Vico and Spengler is inevitable. Spengler's prediction of decline and failure in the West was particularly disturbing since his projections coincided with the

catastrophic events of World War I. Sorokin's analysis also seems timely given the widespread despair experienced by so many in the twentieth century, a century some have described as the dark century.

Several contemporary authors have suggested that our Western culture is in decline. Capra (1982) in his work The Turning Point projects profound changes in Western society. He sees these changes as eminent. Like Sorokin, Capra feels the time has past for Western culture as we know it (Capra, 1982). He states:

Cultural transformations of this magnitude and depth cannot be prevented. They should not be opposed but, on the contrary, should be welcomed as the only escape from agony, collapse, or mummification. What we need, to prepare ourselves for the great transition we are about to enter, is a deep reexamination of the main premises and values of our culture, a rejection of those conceptual models that have outlived their usefulness, and a new recognition of some of the values discarded in previous periods of our cultural history. (p. 33)

Capra's call for a reexamination of the premise on which our current cultural system is built would seem to be valid. Sorokin has credited our current Sensate culture as being the cause of great upheaval in this century.

The way out can only come through careful introspection. Sorokin (1947) has also called for careful analysis of the current Sensate systems as a way of ameliorating the efforts of cultural transition. Capra (1982) calls for more than just superficial change. He states:

A thorough change in the mentality of Western culture must naturally be accompanied by a profound modification of most social relationships and forms of social organization--by changes that will go far beyond the superficial measures of economic and political readjustment being considered by today's political leaders.

(p. 33)

As with Sorokin, Capra hopes these changes will be harmonious and peaceful (Capra, 1982). Kuhn (1970) has suggested that such profound changes in social structure are usually resisted by those in power. Kuhn (1970) suggests that old ways of thinking, which he describes as paradigms, rarely are accepted immediately. He points to the fact that Newton's work was not generally accepted until many years after publication (Kuhn, 1970). Yet Kuhn feels that the shift from one paradigm to another cannot be forcefully imposed (Kuhn, 1970). He states:

The transfer of allegiance from paradigm to paradigm is a conversion experienced that cannot be forced. Lifelong resistance, particularly

from those whose productive careers have committed them to an older tradition of normal science, is not a violation of scientific research itself. The course of resistance is the assurance that the older paradigm will ultimately solve all its problems. (pp. 150-151)

If the current cultural transition is irreversible, as Sorokin and Capra suggest, how are we to overcome the resistance to such a transition? While Kuhn was speaking of scientific resistance to change, we can apply his words to virtually every profession. The answer to this question may lie in our language base.

Curriculum specialists must necessarily deal with any forthcoming paradigm shifts. Not to do so could prove fatal. Sorokin's works suggest that all institutions, including schools will be impacted by these changes. Capra (1982) suggests the language of the new science of Quantum Physics. In light of the implications of Sorokin's thesis, all suitable avenues to foster peaceful transition need to be examined.

Empirical evidence lends support to Sorokin's general thesis. Astounding crime rates, general delinquency and a lost sense of purpose seem endemic in the period since World War II. Curriculum theorists largely have operated from a linear mindset and have failed to consider that our world is in a state of change.

Sorokin's image of transition is also supported by the political changes seen since World War II. Most recently, the fall of the Berlin Wall and the fall of communism have created dramatic political change. Sorokin uses the word chaos in his work a great deal. Chaos seems an appropriate word to use in describing our current world crisis.

Additionally, Sorokin seems to have anticipated the problems of the late twentieth century school. Dysfunctional families, drugs, etc. are all discussed in Sorokin's works (Sorokin, 1947). It is important to remember that Sorokin was writing at a time when America was at its pinnacle. Generally, these social problems were not the front page news as they are today.

As mentioned earlier, Sorokin's works lend support for the need for a new language base for schools and for society in general. Chapter IV deals with the possibilities of the new quantum science to provide us with such a language.

CHAPTER IV

THE NEW SCIENCE: METAPHOR FOR VIEWING TRANSFORMATIONAL THEORY

Sorokin has described how a particular means of viewing the world came to dominate societies. His view that the current mindset, that of the mechanistic-linear mind based upon the language of Newton, is the dominant mindset, appears to be supportable. Sorokin states that dominant ideologies eventually wear themselves out, or simply eventually fail to meet the needs of society (Sorokin, 1950). Others have written extensively about how dominant ideologies came to change. In the area of the history of science, Thomas S. Kuhn has perhaps been the most noted. Kuhn uses the term paradigm to discuss how visions of reality are formed and to describe how these visions came to change.

Kuhn's Concept of Paradigms

Kuhn (1970) believes that scientists come to share common beliefs and assumptions. These shared beliefs eventually came to be so widely accepted as to form a paradigm. Kuhn does not see science as merely the work of individual scientists seeking to find scientific

meaning. Rather, he feels it is the paradigm that provides the criteria by which scientists work (Phillips, 1987). While scientists may enlarge the paradigm, for the most part they work almost exclusively within the bounds of that paradigm (Phillips, 1987). Consequently, the paradigm can become very restrictive. As Kuhn (1973) states:

Few people who are not actually practitioners of a mature science realize how much mop-up work of this sort a paradigm leaves to be done or quite how fascinating such work can prove in the execution...Mopping-up operations are what engage most scientists throughout their careers. They constitute what I am here calling normal science. Closely examined, whether historically or in the contemporary laboratory, that enterprise seems an attempt to force nature into the preformed and relatively inflexible box that the paradigm already supplies. (Phillips, 1987, p. 21)

This description by Kuhn is particularly revealing for it shows how Kuhn conceives paradigms to be confining. With such restrictive parameters, it is little wonder that dominant paradigms appears to last for long periods of time. They tend to dominate the scientific field. To veer from the paradigm is to risk the scorn of your fellow scientists. To go outside the paradigm is

tantamount to scientific heresy. Paradigms then tend to guide research problems. Moreover, researchers come to see the paradigm as central to their being. They are unable, or perhaps unwilling to give it up (Hergenhahn, 1986). Glieck (1987) describes how the scientific community reacted to the introduction of the new language of chaos theory:

Every scientist who turned to chaos early had a story to tell of discouragement or open hostility. Graduate students were warned that their careers could be jeopardized if they wrote theses in an untested discipline, in which their advisors had no expertise. A particle physicist hearing about this new mathematics, might begin playing with its own, thinking it was a beautiful thing, but beautiful and hard--but would feel that he could never tell his colleagues about it. Older professors felt they were suffering a kind of midlife crisis, gambling on a line of research that many colleagues were likely to misunderstand or resent. (p. 37)

Kuhn's description of how dominant scientific paradigms come to dominate all scientific research, seems to mirror the philosophy of Sorokin. Sorokin (1941) described how the dominant Sensate culture of the modern Western world came to dominate our system of truth:

Hence it follows that the sensory cultures regard investigations of the nature of God and supersensory phenomena as superstitious or fruitless speculation. Theology and religion, as a body of revealed truth, are at best tolerated, just as many hobbies are tolerated; or are given mere lip service; or are transformed into a kind of scientific theology, and sensory religion reduced to the level of empirical disciplines devoid of revealed truth. (p. 86)

While Sorokin does not use the word paradigm, it is clear he is speaking of a Kuhnian type paradigm, one that comes to determine what is truth. In Sorokin's view the dominant paradigm eventually impacts virtually every aspect of society.

Kuhn's Concept of Paradigm Shifts

If, as Kuhn implies, the dominant paradigm determines that which is legitimate science how do new paradigms come into existence? Kuhn (1970) states that it is the appearance of anomalies that cause the dominant paradigm to begin to be questioned. If enough anomalies appear the paradigm may be deemed inadequate. Anderson, Hughes, Sharrock (1986) in regard to Kuhn's concept of how paradigm shifts occur state:

Out of the ferment that occurs during the break-

up of an established paradigm, one new framework gradually emerges. This is popularized and adopted. The new framework has novel and different standards of measurement, new topics methods, concepts and problems. Most of all, it enables new observations to be made. Scientists see things differently...The anomalies gradually keep up until they become intolerable. Everyone becomes convinced of the inadequacy of the existing paradigm and the search for a new one starts. The revolution begins once more. (p. 251)

This description of how paradigms shift places Kuhn's philosophy in line with Sorokin's views. While Kuhn is speaking almost strictly from the viewpoint of scientific methodology, Sorokin is speaking of the inability of the current social paradigm (that of the Sensate culture) to provide for the needs of society. Kuhn's scientific anomalies can be seen as Sorokin's societal anomalies.

Chapter II of this dissertation attempted to explain the emergence of the Newtonian mindset in the Western world. The replacement of this dominant paradigm, if one follows Kuhn's logic, could only come about when the language or rules of that paradigm come into question. The early twentieth century saw the development of new scientific thinking that has brought Newtonian science

into question. The science of quantum physics, which can best be described as the study of science at the sub-atomic level, has rendered much of the Newtonian world view inadequate. Quantum physics has presented the scientific community with far too many anomalies to allow a steadfast adherence to the Newtonian paradigm. As Kuhn (1973) has described, the scientific community seems to have undergone a transformation in its thinking.

Capra (1984) believes that quantum physics has influenced all aspects of society. He states:

Modern physics has had a profound influence on almost all aspects of human society. It has become the basis of natural science, and the combination of natural and technical science has fundamentally changed the conditions of life on our earth, both in beneficial and detrimental ways...The exploration of the atomic and subatomic world in the twentieth century has revealed an unsuspected limitation of classical ideas, and has necessitated a radical revision of many of our basic concepts. (p. 3)

Capra (1984) is convinced that the new science of quantum physics is propelling us toward a new paradigm. A paradigm which will effect not only the scientific community, but our entire world view (Capra, 1984, pp. 3-4). A careful examination of the philosophical implications of

quantum physics lends credence to Capra's thesis. When examined from a philosophical perspective, Kuhn's view of how paradigms begin and then shift, and Sorokin's prediction of an emerging culture which seems to be taking us away from the deterministic Newtonian world view, take on interesting parallels to the science of quantum physics.

The Philosophical Implications of the New Science

Despite the fact that the science of quantum physics has been with us for the better part of the twentieth century, we have been slow to embrace the philosophical implications of this new science. Randall (1940) suggests that it is normal for us to try and put the new discoveries into the old equations. Randall (1940) seems to believe as Kuhn did that it is in the best interest of the old paradigm to try and make the new fit. But beginning with Einstein and Planck, the implications of quantum theory have caused inevitable cracks in the jargon of deterministic philosophy.

Albert Einstein's theories were among the first to bring the linear-deterministic aspects of Newtonian science into question. Einstein as a teenager posed a question to himself that would eventually have a profound influence on the world: "What would the world look like

if I rode on a beam of light?" (Bronowski, 1973, p. 247). By asking this question, young Einstein began an intellectual pursuit that would eventually lead him to construct his theory of relativity. In 1905 Einstein published a paper entitled On the Electrodynamics of Moving Bodies, (Untermeyer, 1955). In this essay Einstein called into question the Newtonian concept of a linear and fixed notion of time and space (Untermeyer, 1955, p. 534). For Einstein had provided an answer to the boyhood questions he had posed to himself. Einstein (1905) carried forward his question in his essay as follows:

Suppose this tram were moving away from that clock on the very beam with which we see what the clock says. Then, of course, the clock would be frozen. I, the tram, this box riding on the beam of light would be fixed in time. Time would have to stop...Let me spell that out. Suppose the clock behind me says 'noon' when I leave I now travel 186,000 miles away from it at the speed of light; that ought to take me one second. But the time on the clock, as I see it, still says 'noon', because it takes the beam light from the clock exactly as long as it has taken me. So far as the clock as I see it, so far as the universe inside the tram is concerned, in keeping up with

the speed of light I have cut myself off from the passage of time. (Bronowski, 1973, pp. 247-248)

By demonstrating that motion and rest are relative, Einstein had called into question the very core of Newtonian science. Untermeyer (1955) states:

Newton's followers were convinced that motion and rest were absolute and measurable; Einstein demonstrated that motion and rest are relative: measured differently by different observers. From this starting point, he proceeded to demolish the more sacred absolutism of length, mass, and time--the three fundamental measures on which all other quantities depend. (p. 534)

Indeed, Einstein had presented Newtonian science with a whole series of Kuhnian anomalies. Bronowski (1973) described just how foreign this new concept was to the Newtonian view. He states:

For Newton, time and space formed an absolute framework, within which the material events of the world ran their course in imperturbable order. His is a God's eye view of the world; it looks the same to every observer, wherever he is and however he travels. By contrast, Einstein's is a man's eye view, in which what you see and what I see is relative to each of us, that is, to our place and speed. And this relativity cannot

be removed. We cannot know what the world is like in itself we can only compare what it looks like to each of us, by the practical procedure of exchanging messages. (p. 249)

When Einstein's General Theory of Relativity was confirmed in a series of experiments conducted by the Royal Society of Brazil in May of 1919, the Newtonians had little left upon which to base their objections (Bronowski, 1973, p. 254). The philosophical consequences of Einstein's theories were already being formulated by 1919.

It is interesting to note that many see Einstein as more of a philosopher than a mathematician (Bronowski, 1973). As stated earlier, this new philosophy based on the concept of relativity dealt a heavy blow to the deterministic philosophy. Einstein (1955) spoke directly of the determinist philosophy of David Hume when he states:

By his clear critique Hume did not only advance philosophy in a decisive way but also--through no fault of his--created a danger for philosophy that, following his critique, a fateful "fear of metaphysics" arose which has come to be a malady of contemporary empiricistic philosophizing; this malady is the counterpart to that earlier philoso-phizing in the clouds, which thought it

could neglect and dispense with what was given by the senses. (Levi, 1959, p. 260)

There can be no doubt from reading the above passage that Einstein was attacking the strict empiricist views brought about by Newtonian principles. It is significant that he states that Hume came to this conclusion "through no fault of his own" (Levi, 1959, p. 240). Einstein seems to imply, as Kuhn has alluded to, that Hume was simply a victim of the dominant paradigm. Einstein here does not reject empiricism entirely. Rather, by alluding to metaphysical possibilities and sense experience, he seems to be advancing a philosophy which would consider both as viable. This constitutes a combination similar to Sorokin's Integral culture. In that culture Sorokin (1949) states that the Integral system in its ultimate reality is as follows:

Its ultimate principle proclaims that the true reality-value is an Infinite Manifold which has supersensory, rational, and sensory forms inseparable from one another...it includes the empirical as well as the superempirical aspects of reality, science as well as philosophy and theology. (Oliver, 1989, p. 28)

If Sorokin was correct in his belief that the Sensate culture of the post Enlightenment era will give way to an Integral culture, Einstein's theories emerge as a

legitimate metaphor for such a change. Einstein's philosophy is indeed a holistic philosophy. Sensory perception is accepted, but not in isolation from the metaphysical aspects of philosophy. By alluding to metaphysical supposition, Einstein was going against the grain of over three hundred years of philosophical rhetoric. He seemed to be anticipating what late twentieth century philosophers, including curriculum experts, are calling holism. Einstein (1939), in a somewhat doubt-ridden statement, seemed to call for a more holistic view:

I see on the one side the totality of sense experiences, and, on the other the totality of the concepts and propositions themselves are of a strictly logical nature...The concepts and propositions get "meaning", i.e., "content" only through their connections with sense experiences. The connection of the latter with the former is purely intuitive. (Levi, 1959, p. 260)

By bringing intuition into the arena, Einstein calls for more than strict empiricism. We gain meaning through sense experience but only when it is connected with the non-logical. Reality, according to Einstein, is relative. We cannot find as simple a solution to the mysteries of the universe as Newtonian mechanics had once promised. For philosophy, the mysterious (metaphysical)

could now be legitimately debated once again, with the blessings of no less a genius than Albert Einstein.

The quandary for the Positivists was that with science now giving credence to the intuitive approach, subjective reality was no longer so easy to dismiss. Pagels (1982) states, "A strong antipositivist element central to Einstein's method is the intuitional leap from experience which sets up the absolute postulate in the first place" (p. 58). Science, which had given the Positivists its credibility was now a very real consideration for science (Pagels, 1982, p. 58).

It is important to note that Einstein did not abandon classical theory (Pagels, 1982). In fact, Einstein sought to provide a single unified theory that would allow Classical Newtonian science and quantum physics, along with his own relativistic notions, to exist side by side (Levi, 1959). Einstein (1940) sought to improve physics not destroy it (Levi, 1959, p, 264). He states:

...it cannot be claimed that those parts of the general relativity theory which can today (1940) be regarded as final have furnished physics with a complete and satisfactory foundation. In the first place, the total field appears to be composed of two logically unconnected parts, the gravitational and the electromagnetic. And in the second place, this theory, like the other

field theories, has not up till now supplied an explanation of the atomistic structure of matter. This failure has probably some connection with the fact that so far it has contributed nothing to the understanding of quantum phenomena.

(Levi, 1959, p. 264)

In this passage Einstein held out the belief that his own relativity theory and quantum mechanics could be unified. But how so? Einstein was never able to resolve this in his lifetime (Pagels, 1982). However, it is clear that he believed the resolution was ultimately to incorporate metaphysical issues (Levi, 1959). Meanwhile, the further development of quantum theory, which Einstein viewed as too superficial, was moving even further away from deterministic physics (Pagels, 1982, p. 61).

Quantum Physics: Metaphor for Cultural Transformation

Einstein had proven that time and space were not the absolutes as once supposed. He was to maintain that the event is the thing which reality must be focused on, not the point in space or the instant in time (Einstein, 1955, p. 30). Quantum physics, in much the same way, has brought into question the absolutes proposed by the Newtonian paradigm. Max Planck (1858-1947) began his work on the problem of black-body radiation in the early

part of the twentieth century. Planck proved that such radiation was emitted in discrete amounts called quanta (Zukav, 1979). This contrasted with the prevailing scientific view that such radiation was emitted in constant variables. Planck, like Einstein, had shown that the laws put forth by Newtonian science simply did not conform to all levels of activity. At the sub-atomic level strange things indeed were occurring. As Stromberg (1966) states:

The world within the atom soon became most puzzling, the behavior of electrons breaking all sorts of laws heretofore regarded as sacrosanct. At the turn of the century, Max Planck's quantum theory asserted that energy is emitted discretely and not continuously, in little packages, as particles of matter would be expected to behave; they did not bounce or eject the way "ordinary" objects do in the everyday world. (p. 346)

Planck was able to bring into question the laws upon which modern physics had been built. Kuhn (1970) has suggested that paradigm shifts are often invisible to participants in them. Planck demonstrated that the world of sub-atomic particles could no longer remain hidden. Scientists were faced with an anomaly of great proportions. For his work Planck was awarded the Nobel prize in physics in 1981. Even the great Einstein was

moved to comment on the discoveries of Planck. In 1914 he states:

About fifteen years ago nobody had yet doubted that a correct account of the electrical, optical and thermal properties was possible on the basis of Galileo-Newtonian mechanics applied to the movement of molecules...Then Planck showed that in order to establish a law of heat radiation consonant with experience, it was necessary to employ a method of calculation the incompatibility of which with the principles of classical physics became clearer and clearer...with this quantum hypothesis he dethroned classical physics as applied to the case where sufficiently small masses are moved at sufficiently low speeds and high rates of acceleration, so that today the laws of motion proposed by Galileo and Newton can be allowed validity as limiting laws. (Levi, 1959, pp. 250-251)

The great Newton's laws were at last being seen as limited. This was a great contrast to the view of the Age of Enlightenment of the seventeenth century. For the Enlightenment had posed Newton's laws as the laws of progress. Laws that would forever take us forward. That they might be limited in their ability to answer certain

questions was a disturbing revelation to many. Just as Einstein had unsettled the scientific and philosophic communities, Planck did so too.

Neils Bohr (1885-1962) soon added to Planck's work. Bohr's work centered on what science referred to as the particle wave paradox. Evidence existed to suggest that in some instances that photons and electrons behave like corpuscles, and at other times they behaved as waves (Levi, 1959). Bohr (1934) was to reason that the particle and wave qualities were complementary views of the same reality. Capra (1982) feels that Bohr's resolution to the particle/wave paradox forced physicists to call into question the foundations of the mechanistic world (p. 80). He states:

At the subatomic level, matter does not exist with certainty at definite places, but rather shows "tendencies to exist", and atomic events do not occur with certainty at definite times and in definite ways but rather show tendencies to occur". In the formalism of quantum mechanics, these tendencies are expressed as probabilities.

(p. 80)

The language of physics, and subsequently science in general, was now faced with having to deal with probabilities and not certainties. The "double whammy" of Einstein's Relativity theories and quantum physics

served as a horrific blow to the Positivists. The obtainment of absolute certainty suddenly appeared out of reach.

The challenge to the determinists did not end with Bohr. In 1925 Karl Werner Heisenberg (1901-1976) set forth a new theory of quantum mechanics based upon certain aspects of Bohr's earlier works (Levi, 1959, p. 257). Heisenberg speculated that both position and momentum of a particle were not capable of being measured simultaneously. He was to demonstrate mathematically that to know the position of a particle was to be "uncertain" of the momentum of that particle (Pagels, 1982). In short, Heisenberg was to add further to the growing realization that indeterminacy was to guide the field of physics in the future. Heisenberg postulated that the observer would always interfere with that which was being observed (Pagels, 1982). He further implied that meaningful observation could occur only when the observer interacted with the object (Heisenberg, 1974, p. 81).

The combined works of Bohr and Heisenberg became known as the "Copenhagen Interpretation" of quantum mechanics (Pagels, 1982, p. 87). Together they had proved that the Newtonian framework for physics at the sub-atomic level was simply not adequate to explain certain phenomena. Knowledge based upon Newtonian logic

was thus called into question.

The Philosophical Implications of the New Science

Positivist philosophy seeks to know the qualities of an object beyond question. Empirical evidence was needed to establish such certainties. As has been stated quantum-mechanics insinuates that such certainties are not likely to be obtained. Reality is not always as it seems. Empirical evidence alone may or may not provide certainty. The determinacy of the Newtonian paradigm had brought forth a certain smugness in philosophical inquiry. Just when the Positivists seemed ready to pronounce their obtainment of reality, quantum physics, and its accompanying randomness, pressed forward. Pagels (1982) states, "the very act of attempting to establish determinism produces indeterminism" (p. 86). In other words, the more certainty we seek in the quantum world the more paradoxes we are presented. From the positivist perspective this would seem to be a disaster. Taken from a different perspective it need not be. Pagels (1982) describes the determinists reaction to the randomness of quantum physics. He states:

It is this very randomness that makes the determinist recoil. Physics, as it was conceived of for centuries, was supposed to predict precisely

what can happen in nature. In the quantum theory, only probabilities are precisely determined, and the determinist finds it difficult to renounce the hope that behind quantum reality a deterministic reality exists. But in fact the quantum theory has closed the door on determinism. (p. 86)

Pagels (1982) does not believe knowledge to be unobtainable but prefers to see the realization of a random world as the door to a new vision (Pagels, 1982, p. 86). He states:

To the contrary, the discovery of the indeterminate universe is a triumph of modern physics and opens a new vision of nature. The new quantum theory makes lots of predictions--all in agreement with experiment. But these predictions are for the distribution of events, not individual events--it is like predicting how many times a specific hand of cards gets dealt on the average. (p. 86)

By implying that science must move to a more intuitive mode of thought to comprehend the universe more fully, quantum physics calls forth modes of thought previously discounted in the Newtonian paradigm. Metaphysics could now be placed back into the scientific community. Philosophers began to see metaphysics something more than

mere fantasy. The language base of Newtonian science merged with the concepts of the new science holds promise for establishing a new paradigm of thought, a paradigm richer and more capable of dealing with the problems of the modern world.

Speculations on the Emerging Paradigm of New Science

Capra (1981) has identified five criteria for viewing what he calls an emergent paradigm based on the new science of quantum physics. His criteria are based on an holistic view of nature. He also uses the terms ecological and systematic to describe the new paradigm (Capra, 1991, p. xi). Ferguson (1980), Pagels (1982), and Zukav (1979) have also used similar terminology to describe an emergent paradigm built on the language of quantum physics. Capra's criteria are as follows:

In the new paradigm, the relationship between the parts and the whole is reversed. The properties of the parts can only be understood from the dynamics of the whole. Ultimately, there are no parts at all. What we call a part is merely a pattern in an inseparable web of relationships.

(Capra, 1991, p. xii)

This portion of Capra's thesis goes to the heart of quantum physics. Reductionism does not lead to full

understanding. Quantum physics necessitates looking at the whole to comprehend the various components of an object. Ferguson (1980) also calls for a new world vision based upon holism. She states, "modern science has verified the quality of whole-making, the characteristic of nature to put things together in as ever-more synergistic meaningful pattern" (Ferguson, 1980, p. 156). The Newtonian paradigm of science suggests that the whole is understood through its parts (Capra, 1991). The new paradigm based on quantum physics clearly contradicts this concept.

Capra (1991) also maintains that the new science calls for a process approach. He suggests that all relationships are dynamic and are part of an underlying process (Capra, 1991, p. xii). He states:

In the new paradigm the relationship between the parts and the whole is reversed. The meaning of individual dogmas can be understood only from the dynamics of revelations as a whole. Ultimately revelation as a process is of one piece.

Individual dogmas focus on particular moments in God's self-manifestation in nature, history and human experience. (p. xii)

Capra has emphasized process over atomization. Pagels (1982) has also suggested that process is integral to the method of quantum physics. Einstein also suggested that

science would have to proceed based on deeper meanings, such as intuition (Calder, 1979). Ferguson (1980) also identifies a process approach in the new science. By calling for a process approach based on the new science, Capra challenges the supremacy of a particular culture or ideology (Capra, 1991).

Capra (1991) identifies the objective nature of the old paradigm of Newtonian science. The human observer played no role in the descriptions of science (Capra, 1991). Capra believes the new paradigm focuses on, as he calls it, "the understanding of the process of knowledge" (Capra, 1991, p. xiii). The human observer becomes integral in such a process view. Capra (1991) states:

In the old paradigm descriptions were independent of the human observer and the process of knowledge...At this point there is no consensus what the proper epistemology is, but there is an emerging consensus that epistemology will have to be an integral part of every scientific theory.
(p. xiii)

This shift from objective reality to an emphasis on ways of knowing began with the ideas of Einstein. Einstein indicated in his early writings that any hope of understanding the universe would probably be the result of nontraditional scientific methods (Medawar, 1984). The spiritual (theological) is elevated to a new purpose

in such a view.

Capra (1991) also speaks of a shift in the use of metaphor with the new science. The new paradigm is seen as replacing the metaphor of building to a metaphor of network. He places special emphasis on the interconnectedness of all objects (Capra, 1991).

Finally Capra suggests that the new emerging paradigm will place special emphasis on the mysterious (Capra, 1991). Capra (1991) states:

The new paradigm, by greater emphasis on mystery, acknowledges the limited and approximate character of every theological statement...The theologian, like every believer, finds ultimate truth not in the theological statement but in the reality to which this statement gives a certain true, but limited expression. (p. xv)

Under such a system science would deal more with approximates and not absolutes. All aspects of society and culture become aspects of truth. All dogmas are limited in their ability to express ultimate reality.

Implications of the New Science to Sorokin

Sorokin (1941) projected that Western culture was on the verge of great change. He speculated that such change was inevitable and could not be halted. He

presents us with a vision of culture in extreme despair, grasping for life. Sorokin anticipated that the cultural transition would result in a new integrated culture (Sorokin, 1941, p. 25). Sorokin (1941) states:

The tragedy and chaos, the horrors and sorrow of the transition period being over, they will evolve a new creative life, in a new integrated form, as magnificent in its own way as five centuries of sensate culture...Moreover, such a change, however painful, seems to be the necessary condition for any culture and society to remain creative throughout their historical existence. No fundamental form of culture is infinite in its creative possibilities, but is limited. (p. 25)

By addressing the possibility of an emerging paradigm, Sorokin has anticipated the theme of those espousing a new paradigm based on the new science of quantum physics. For transformation seems a logical consequence of the quantum revolution. Sorokin's challenge to us is to limit the tragic aspects of cultural transformation (Sorokin, 1941). Sorokin (1941) states:

We have the rare privilege of living, observing, thinking, and acting in the conflagration of such an ordeal. If we cannot stop it, we can at least try to understand its nature, its causes, and its

consequences. If we do this, we may be able, to some extent, to shorten its tragic period and to mitigate its ravages. (p. 29)

Quantum physics, with its emphasis on holism, presents us with a possible metaphor to help us in the transition Sorokin speaks of. For holism implies that understanding is essential. Understanding of the whole and not just of particular situations. Sorokin implies that the crisis of the Sensate culture, which is centered in the old Newtonian paradigm, will impact all aspects of our lives (Sorokin, 1941). Consequently, there would seem to be a great need for a language base that would allow us to make a peaceful transition. Quantum physics views Newtonian logic as a partial truth. By merging the old (Newtonian logic) with the new (quantum-theory) a new language base may emerge. Such language could allow for competing groups to come to an understanding. Ferguson (1980) hints at such a possibility. She states:

A new paradigm involves a principle that was present all along but unknown to us. It includes the old as a partial truth, one aspect of how things work, while allowing for things to work in other ways as well. By its larger perspective, it transforms traditional knowledge and the stubborn new observations, reconciling their apparent contradictions. (Ferguson, 1980, p. 27)

Kuhn (1970) has stated that old paradigms die hard. Those with a vested interest in keeping the old paradigm intact are not likely to give up quickly. But the language of the new science allows the old guard to keep their old language to an extent. Hope then emerges for a peaceful transition. Furthermore, the new science of quantum physics has presented science and philosophy with a number of anomalies that seem to bring the Newtonian paradigm into question.

Ferguson (1980) states that we are learning to recognize that a transition is underway (Ferguson, 1980, p. 407). She states, "we are learning to read tendencies, to recognize the early signs of another, more promising paradigm (Ferguson, 1980, p. 407). Ferguson's words mesh with those of Sorokin. Sorokin (1941) repeatedly speaks of the emerging Integral culture as a superior culture.

Sorokin (1941, 1947) states that the crisis of the Sensate culture was a crisis that would impact all aspects of society. Curriculum theorists it can be reasoned, are not to be exempt from these changes. Schools have generally been viewed as agents for social change. The language of the new science and the works of Sorokin give curriculum theorists ample reason to consider the implications of their views.

Reference was made in an earlier chapter to the

Carnegie report on education, A Nation at Risk.

Certainly, many people in America view our society and our schools as being at risk. Sorokin has demonstrated that the Sensate culture with its emphasis on materialism is incapable of solving the crisis. A survey of American society leads me to concur with his thesis. How then are we to deal with the crisis? Some suggest that a new language base is needed to avert full scale disaster in our society. Such a language base needs to hold forth promise, not despair.

The language of quantum physics suggests hope. We are lead to a vision of wholeness through the quantum meta-phor. A new vision of reality is called for through the quantum metaphor that embraces the spiritual (intuitive) as well as the objective. Absolutes which have been touted by the Newtonian paradigm, are brought into ques-tion by this new language. Certainty is no longer the goal of the classroom, but understanding is. It is, in short, a language of hope.

The new language of quantum physics does not accept the fragmentation of the old Newtonian paradigm. We are forced by quantum mechanics to look at the whole structure before any real understanding can take place. Put another way, the atomization of knowledge can no longer suffice as a legitimate way of knowing under the new science. Fragmentation would seem to lead us in a

circle of futility.

Modern society has placed great emphasis on the breaking down and analyzing of facts. While this process can work in a limited sense, it can be a hindrance. Sorokin has indicated that his Integral culture is a culture that accepts aspects of other cultures, and views them as aspects of truth. Western culture has grown increasingly unaccepting of methods that fail to meet scientific standards. This very adherence to scientific method is reflective of the overripe Sensate culture described by Sorokin, in that all contrary views are disregarded as unscientific.

The reinstatement of words such as mysterious, mystical, uncertainty, etc. into science seems strange indeed to the Newtonian mindset. However, such words are commonplace in the quantum paradigm. Such words give hope to the human spirit and can possibly give us answers to the "crisis of our age" that Sorokin spoke of.

Curriculum, as has been demonstrated, seems to be mired in the language of Newtonian science. This is logical given the widespread effects of Newtonian logic on all aspects of Western society. Yet, by examining the alternative paradigm of quantum mechanics, we are drawn to a conclusion that our current methods of curriculum theorizing are far too limited.

From my study of the emergence of the Newtonian

paradigm as the dominant mindset in Western society, I have concluded that we indeed have become over reliant on its tenant as our basis of truth. The science of quantum physics leads me to conclude that a fuller, more appropriate language base is available from which to construct curriculum theory.

CHAPTER V

CULTURAL TRANSFORMATION: IMPLICATIONS FOR CURRICULUM THEORISTS

Sorokin (1941) in his work The Crisis of Our Age predicted that the last half of the twentieth century would be an age of chaos. His thesis stemmed from the contention that cultures in a state of revolution are prone to chaotic convulsions (Sorokin, 1941, 1947). There would seem to be ample evidence to support Sorokin's thesis. Curriculum workers, in particular, are faced with dealing with the sudden, and often violent, changes of our times. Based on a recent government study, the plight of children in the last quarter century has not been good (Federal Study, 1992). The study states, "American children are in trouble" (Federal Study, 1992). Several factors were mentioned as contributors to the current state of affairs. The study commissioned by the federal government states:

They point to steadily decreasing spending on child rearing by government and households in the last 30 years and changing cultural forces, including the effects of divorce, television, waning religion and more permissive society, as

factors fueling the trend. (Dallas Morning News, 1992, p. 1)

Interestingly, the authors of the government study encourage legislation and government spending as the possible solution to the problem (Daily Oklahoman, 1992, p. 1). But this solution has been offered many times before and has not solved the current crisis. The cultural crisis described by Sorokin involves all aspects of society (Sorokin, 1941). Sorokin suggests that any solutions to the crisis must come as a result of a transformation of our thinking (Sorokin, 1941, 1947). Thus, curriculum workers must begin to explore the implications of such a transition and begin to shape a language base from which to work. Kuhn (1970), as has been stated in Chapter II, tells us that such shifts in thinking are very difficult and often are met with extreme resistance. Kuhn (1970) states, "lifelong resistance, particularly from those whose particular careers have been committed to the older paradigm will resist change" (Kuhn, 1970, pp. 150-151). It is not surprising that "solutions" to our current crisis are most always formed in the language of the day. Apple (1975) believes that these modes of thought have become so entrenched as to be "taken for granted" (p. 121). Kuhn (1970) believes that we will go to almost any extreme to make sure that the current paradigm is upheld.

Even if that means forcing the paradigm to fit reality (Kuhn, 1970, p. 135). But in the long run such forcing does not solve the problems. The inability of the old paradigm to create genuine solutions to the crisis remains.

Curriculum theorists have been trained in a particular paradigm and they too are resistant to change. Dobson, Dobson, and Smiley (1991) refer to this as an allegiance to conventional wisdom (p. 41). They state, "conventional wisdom also can contaminate curriculum knowledge construction efforts" (Dobson, Dobson, and Smiley, 1991, p. 41). Allegiance to the conventional wisdom (dominant paradigm) hampers any efforts to come to viable solutions to curriculum problems.

The current mindset of the majority of curriculum workers appears to be that of the rational scientific mode (Schopen, 1989). Curriculum workers such as Franklin Bobbitt (1918), Ralph Tyler (1949) and Madeline Hunter (1984) all reflect the dominant scientific rationale in their writings. In such a model curriculum theory tends to work on an industrial/technological mentality (Brown, 1989, p. 10). Economic and social advancement became the primary goals upon which schooling is based (Purpel, 1989, p. 18). Purpel (1989) states:

This means that the dominant culture and the dominant professional community have committed

themselves to facilitating the conception of the school as a place where students compete and where they may expect to learn the necessary requirements for economic and social advancement. This concern for acculturation does not necessarily exclude but certainly distracts us from serious reexamination of our basic premises. It does not reflect a commitment to moral or aesthetic excellence or a commitment to nourish the imagination or the idealism of our students. (p. 18)

Purpel is very critical of what he calls the cultural, "status quo" (Purpel, 1989, p. 18). Sorokin (1941) has theorized that cultures in their last stages tend to fight hard to maintain a status quo. Sorokin (1941) writings tend to lend support to Purpel's contention regarding the role(s) of our schools. Sorokin (1941) wrote the following passage regarding the role of schools:

Of like character is the educational system, which is first and foremost a training school devoted to "useful knowledge" and the crafts. Its chief business is to prepare successful businessmen, craftsmen, engineers and technicians, politicians, lawyers, doctors, teachers, preachers, and so on. Mastery is

sought in such arts as amassing a fortune,
farming, home cooking, research work,
teaching...scant attention, if any, is paid to
the forgotten purpose of real knowledge and
wisdom: the nature of true reality and values.
(p. 101)

According to Sorokin schools have traditionally served to support the dominant paradigm in existence at the time (Sorokin, 1941). Curriculum then becomes grounded in the dominant paradigm and are often unable to create reasonable alternatives for the educational process. Problems go unsolved and the dominant ideology upon which our schools is based goes unchallenged. Innovation and creativity, which are described as new ways of seeing the world, tend to be ignored. Apple (1990) quotes Sigel (1950) as saying:

There is probably little doubt that the public schools are a choice transmission belt for the traditional rather than the innovative, much less the radical. As a result, they facilitate the political socialization of the mainstream young and tend to equip them with the tools necessary for the particular roles they are expected to play in a given society. One may wish to quarrel with the differential roles the government and the schools assign to students, but it would

probably be considerably more difficult to deny the school's effectiveness. (p. 85)

Problems arise when what schools are transmitting to students fail to meet the demands of a changing culture. While although still in a preeminent position, the dominant paradigm may not be serving society to its fullest. To Sorokin (1941, 1947), the dying Sensate culture based upon the mechanistic metaphor of the Newtonian paradigm, is no longer capable of solving the crisis of our age. To Sorokin the age of materialism has proven to be an unsatisfactory model. New avenues for solving problems must be found.

If modernity as exhibited by Sorokin's Sensate culture is an inadequate model for our schools to follow, what are the alternatives? Sorokin implies that a more holistic approach must be found to complete our understanding of our role(s) in the cosmos (Oliver, 1989). By moving in that direction we must embrace new ways of knowing. We cannot reject that which does not fit into the mechanistic model. Oliver (1989) agrees with Sorokin's point. He states:

We would agree with Sorokin that the major challenge of working toward a new and positive conception of culture is not the discounting or costing out of some quality or feeling or understanding, but rather the inclusion of

aspects of universe/nature which have tended to be underappreciated. (p. 29)

The scientific paradigm based on the Newtonian view of nature has placed its emphasis on the empirical-materialistic aspects of reality. In earlier chapters it was demonstrated how the Newtonian mindset has permeated virtually all aspects of Western culture. To move beyond this mindset, and consequently to a new way of knowing, will require much debate. Curriculum workers are faced with the task of fostering the debate. Many curriculum workers suggest the debate should be centered on the need to move to a more holistic paradigm based upon the new science of quantum physics.

The New Science: Metaphor for Curriculum Theorists

Doll (1989) contends that Newtonian thought is at the foundation of present-day curriculum (p. 244). Doll (1989) states:

My argument is that Newtonian thought is one of the foundations on which the present-day curriculum is based. Direct correlations can be made between Madeline Hunter's or Ralph Tyler's notions of a stable universe with planets rotating around the sun in perfect harmony. Harmony is definitely a modern, not a post-

modern, concept, but is the key ideal goal of a Tyler-Hunter curriculum. (p. 244)

With the Tyler-Hunter models we are pointed toward specific outcomes and models. The world is shown to be a specific and very rational place. Doll (1989) refers to such systems as reductionist (p. 244). Innovation is discouraged and perhaps even prohibited (Doll, 1989). These paradigms tend to focus on a body of knowledge and are not transformational (Doll, 1989, p. 244). Doll (1989) states:

Disturbance is not viewed here as key, necessary, or desirable ingredient. Connections can also be made between B.F. Skinner's or James Popham's view of expressing learning in discrete, quantifiable and linear units and Newton's approach to calculus. Both are reductionist, assume the whole to be no more than the sum of the parts, and lead to a curriculum which is cumulative rather than transformative. (p. 244)

In a period of cultural transformation a cumulative curriculum is most probably restrictive and inappropriate. The student emphasis in education on national testing and content driven curriculum is an example of the reductionist-cumulative mindset. This mindset is diametrically opposed to the post-modern view based upon the new science of quantum physics. Doll

(1989) identifies three characteristics of post-modern thought. Doll (1989) cites the following as the primary characteristics of post-modern thought:

1. the nature of open (as opposed to closed systems). (p. 244)
2. the structure of complexity (as opposed to simplicity). (p. 244)
3. transformatory (as opposed to accumulative change). (p. 244)

Each of Doll's criteria for post-modern thought provide a suitable arena for discussing the possibility of an emerging paradigm in curriculum. For if curriculum workers are to go beyond the current parameters of the curriculum field, metaphors must be found to facilitate debate.

Open vs. Closed Systems

Doll's idea of open systems vs. closed systems goes to the heart of transformational theory. Doll (1989) states that, "open systems feed on flux of matter and energy coming to them from the outside world" (Doll, 1989, p. 246). Doll (1989) believes that the new material (flux) actually serves to transform (Doll, 1989, p. 246). He contrasts this attitude to that of a closed system which has pre-set ends which seek to limit outside forces. Doll states, "a closed system, like Skinner's

teacher-proof-machines, wants to protect from the fluxes that compose nature" (Doll, 1989, p. 246). He contrasts that to the open system's approach. He states, "an open system, on the other hand, needs fluxes, perturbations, anomalies, errors: these are the triggers that set-off reorganization" (Doll, 1989, p. 246).

Current curriculum practice seems closed indeed. Change is resisted by our current way of practicing curriculum. Proposals for "reform" are grounded in predetermined language. Such language is unlikely to produce any substantial change since it is simply more of the same. Cultural transformation would appear to demand more than this from curriculum workers. Doll (1989) states:

The curriculum implications here seem obvious—namely curricularists should study open systems in both a metaphorical and literal sense. Metaphorically we should structure and study curriculum in such a manner that internal, autocatalytic transformations are encouraged to occur. Piaget called this phenocopy. In our present closed-system format this concept is absurd: autocatalytic, transformative structures do not appear as part of the literature, and the 'noise' which produces them is quickly and quietly factored out. (p. 246)

If one accepts the thesis that cultural transformation is inevitable and that our current cultural situation as described by Sorokin (1941), as a crisis is unacceptable, then an open system becomes imperative for responsible curriculum theorists. One key to fostering a move to an open-system of curriculum inquiry is the attitude of curriculum theorists to such inquiry. Dobson, Dobson, and Smiley (1991) state:

Curriculum workers, either operating from established paradigms like "logical positivist thought" or from their own creations, should inquire into their own perceived realities of curriculum. Inquiry that becomes too structured inflates the validity of a particular paradigm leading to confirmation bias. This mechanization of a particular paradigm by curriculum workers risks forced results. (p. 41)

Inquiry would seem to be the key element to an open-system of curriculum thought. The new science indicates that pre-set notions are likely to be inadequate. The inquiries of Einstein, Planck, Bohr, Heisenberg, etc. all have indicated that the Newtonian model for science is limited. Inquiry, utilizing this message of the new science, would necessarily lead us to an open-system approach to curriculum.

The Simple vs. the Complex

Doll (1989) describes the universe of Newton as simple (p. 246). He states:

Newton's universe was a simple universe. The mathematics is that of lines, trajectories, areas--all simple, linear concepts. Newton assumed the universe to be one large arithmetic grid with each set of co-ordinates proportionally consistent with every other set of co-ordinates. It was a view of posited harmony, order, uniformity. (p. 247)

Doll points out that this vision of simplicity has dominated the field of curriculum (Doll, 1989). Simplicity leads to objectivity. Current curriculum practice places a great deal of emphasis on objective outcomes. It is thought that we must be able to measure to maintain order. This mechanical view of reality has permeated the curriculum field and the social sciences in general. People in such a system are treated as objects (Lucas, 1985). Lucas (1985) states:

Also implied by the posture of the scientific mechanist was the need for the same objective neutrality and analytic reductionism in the study of human behavior that had proven so successful in investigating physical phenomena. Psychology

would become a natural science. (p. 168)

Such an approach to human behavior is limited and ignores the spiritual aspect of our existence. Doll's complexity model calls for a radical new view of nature. Complexity, Doll argues is an essential part of modern science (Doll, 1989). Doll (1989) states:

Complexity became a part of the scientific world in the early decades of this century when Einstein developed his theory of relativity and quantum physicists explored the strange world of the atom. Today complexity is a field of study in mathematics, in management, and in sociology. It is part of our daily lives. (p. 247)

Doll maintains that complexity is well-like with numerous interacting forces (Doll, 1989, p. 247). Gang (1988) quotes Montessori's statement that, "no matter what we touch, an atom, or a cell, we cannot explain it without knowledge of the wider universe" (p. 15). Gang (1988) maintains that holistic education is a means of addressing the complexities of our universe. He describes such a system as "cosmic education" (Lucas, 1988, p. 15). In a cosmic education children are made aware of the beauty of that which surrounds them, and of the beauty of themselves (Lucas, 1988, p. 15).

Lucas' vision for a new paradigm in education mirrors that of Doll's. For in this paradigm the

interconnectedness of all things is supposed. It is unfolding and transformative (Lucas, 1988). Doll (1989) asserts that the fragmentation of our curriculum prohibits us from approaching the complexities of life (p. 248). To avoid fragmentation the knower and the known must become intertwined (Doll, 1989, p. 248). Thus one of the essential messages of the new science, that of non-separation, is presented in the holistic vision for education.

Doll's vision of complexity in curriculum moves the curriculum from that of simplicity and separateness to one of unity (Doll, 1989, p. 248). Students and teachers learn to share and understand together (Doll, 1989).

Transformation vs. Incremental Change

Doll's final category is that of transformation (Doll, 1989). Sorokin (1941, 1947) has postulated that the late twentieth century will be an age of transformation. Like Sorokin, Doll sees this transformation as positive, even necessary (Doll, 1989). The Newtonian view does not welcome change (Capra, 1982). Change in the modern, closed system is discouraged (Doll, 1989, p. 249). Doll (1989) states, "Change in a modern, closed system is categorically different from change in a post-modern open system. In Newton's ideal universe, stability, not change, was the desired goal" (Doll, 1989,

p. 249). Kuhn (1970) feels change is resisted because those in power do not benefit from change.

Quantum physics presents us with a metaphor for change. Its paradoxes are centered around the notion of change. It encourages us to question old views and to create new views. Quantum physics is certainly not about stability. Doll (1989) reasons that many have viewed quantum physics as strange, "because it violates our normative expectations" (Doll, 1989, p. 249).

Much of the current discussion concerning curriculum is centered on the concept of stability. National testing and in general the back to basics movement, are efforts to create stability. However, curriculum based on the metaphor of quantum physics must necessarily reject such closed thinking. True transformation demands innovation not static proposals. Doll (1989) summarized the post-modern view of change as transformative not incremental (Doll, 1989, p. 249). Doll (1989) states:

A post-modern view looks upon change in an entirely different light. Change is seen in transformative, not incremental, terms; and errors are seen as necessary actions in the process of development--the motors which drive development. Allied with this, of course, are theories of chaos, uncertainty and confusion taking ever increasing roles in the field of

management, mathematics, political science,
physics and sociology. (p. 249)

Transformative change, according to Sorokin is upon us (Sorokin, 1941, 1947). Doll has pointed out that changes have already begun to appear in other areas. Curriculum workers need to begin to consider the repercussions of these changes on our schools.

Curriculum workers, like most everyone, have tended to work from static models. In other words, they proceed from that which is "normal". Zukav (1979) referred to a paradigm as that which we believe to be true (p. 310). He states: "But what we believe to be true is based on a myriad of factors. Truth gets caught up in a web of interactions" (Zukav, 1979, p. 310). Zukav (1979) concludes by telling us that, "What we take to be true is our reality" (p. 310). Curriculum workers often take to be true that which is assumed to be real. Quantum physics calls many of those assumptions into question. Curriculum theory should not shy away from the implications of transformational theory.

Speculation and Conclusions

At least one contemporary sociologist agrees with Sorokin's concept that our social and cultural institutions are undergoing immense change. Alvin Toffler (1990) in his book Power Shift states the following:

For this is the dawn of the Powershift Era. We live at a moment when the entire structure of power that held the world together is now disintegrating. A radically different structure of power is taking form. And this is happening at every level of human society. (p. 3)

The essential message of Sorokin's thesis is based upon the concept of change. Certainly the momentous events of the late twentieth century give us ample reason to ponder the validity of his thesis. The collapse of the Berlin Wall, the fall of communism in Eastern Europe and the incredible social upheaval in the United States are changes that defy the measuring rod of the absolutists. Change is taking place at a pace which outstrips much of our ability to comprehend.

Curriculum workers are faced with the task of dealing with these changes. To remain complacent in the midst of such change is to abrogate our duties. Kuhn (1970) theorized that many who dare to work from a different perspective than that of the dominant paradigm, risk becoming outcasts. But to continue in the safe path is to uphold policies which are bound to fail. Social transformation demands transformation at all levels of thought.

Dobson and Dobson (1981) discuss in their work The Language of Schooling the importance of forming a

language base in curriculum theorizing. I, too, agree that a language base is critical. A language base built upon the metaphor of quantum physics appears to be a legitimate possibility for curriculum workers.

Quantum physics addresses the science of probabilities. It would also seem to present us with a language of possibilities. Quantum physics pushes us toward a language base that recognizes the value of all of nature. Each child, each human being, is to be viewed in the context of the cosmos. In such a view the human spirit literally becomes one with the universe. Consequently, no child or human being can be discounted. Spirituality and subjectiveness once again find a place in the curriculum. Closed systems are merged with open systems, and new visions emerge. Positivism gives way to possibility. Whitehead protested against "the bifurcation of nature into two systems of reality" (Levi, 1959, p. 269). The new language of quantum physics also denies such bifurcation.

Curriculum workers must necessarily be at the forefront of changes in our schools. We have a special responsibility to examine the possible repercussions of cultural transformation, and then act accordingly. Kuhn has alerted us to the fact that paradigm shifts are often difficult (1970). Put another way, paradigm shifts are apt to anger many people. Curriculum workers whose

salaries are paid by those who resist change are not likely to consider alternative paradigms of thinking. As mentioned earlier, cultural transition does not permit us to be so complacent.

Sorokin has presented us with a picture of a Sensate (materialistic-linear) culture that has worn itself out. The old school of thinking simply does not work any more. New ideas, and broader, more open concepts, are called for. Curriculum workers would do well to examine the language base from which they work.

Finally, the language of quantum physics calls forth a picture of process and holism. As a metaphor for curriculum theorizing, the language of quantum physics appears to hold great promise. However, these concepts do not lend themselves to immediate identification. It may be that we simply do not know what works. Yet, we must press forward with the search for meaning and attempt to create a curriculum grounded in the metaphor of holism and process. In short, we must resist the urge to make such a metaphor fit into what we already know.

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Vita 2

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