

Foundations of the Art of Healing and the Science of Caring

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Abstract

The foundational assumptions underlying physical therapy knowledge require deeper critical inquiry. A statement of the problem of practice as both science and art is followed by an argument for fully adopting a new philosophical foundation. Beginning with definitions of context for readers not engaged in ongoing philosophical inquiry, the current worldview is then critically articulated and examined for potential problems. A review of the accepted disablement models is offered as a conceptual framework for bridging to a new, emerging worldview. Adoption of the new worldview will demand reconstruction of the foundational assumptions supporting the base of physical therapy knowledge and practice. The conclusion describes the potential opportunities and challenges of such a foundational shift, and calls for an informed, in-depth dialog between a broader cross section of the physical therapy profession.

Foundations of the Art of Healing and the Science of Caring

Twenty-two years ago Major Lou Keller, a graduate physical therapy research statistics professor, directed a group of physical therapy students that research inquiry should be motivated by a "felt discomfort." The past five years the author has been responding to a "felt discomfort" about who he is, and what precisely is his profession of physical therapy. The inquiry has moved from a traditional orthopedics and sports medicine private practice into one of integrative mind-body science principles. A current transdisciplinary doctoral study of integral education has provided the opportunity for a critical inquiry into the foundations of physical therapy knowledge and practice. The recent release of an APTA sanctioned resource, "Hooked on Evidence," (<http://www.apta.org/hookedonevidence/index.cfm>) stirred a deep *discomfort* that, quite possibly, the title revealed the darker side of an "addiction" than might otherwise be acknowledged by the profession.

If any part of the last sentence stirs a *discomfort* in the reader, pause to consider what that discomfort might be... anger? ...revulsion?...curiosity?...or, fear? The language is intentionally emotionally charged; the style "unscientific," the attitude purposefully "subjective," and, to a degree, confrontational. Such a break from traditional, disinterested and dispassionate writing style illustrates by contrast how sterile and removed the physical therapy profession stands from the disorder and chaos involved in *art* and *caring*. The profession that markets itself as, "The Science of Healing and the Art of Caring," need not plunge into unbridled emotional ranting and raving, but may benefit from critical self-reflection into the authenticity of such a logo. As a profession, is physical therapy equally engaged at both the intellectual and emotional levels the logo

suggests? Or is there need for a "wake up" call to a profession that purports to practice from the head and heart, but whose behavior suggest a *headlong* pursuit of science at the expense of art? The reader is invited to pause to consider the history and philosophical argument for this self-confessed addiction to evidence in hopes of moving back toward balance in the profession.

Beginning with a review of the basic terminology into the inquiry of knowledge, the context will be set for examining the physical therapy model of reality of human movement. Highlights of social and economic influences will set the background and shortcomings in the present dominant worldview. The review of the terminology and philosophical problems is intended for therapists who have experienced a "felt discomfort" about the direction of their profession and practice, but may have lacked the language for articulating such an experience outside esoteric academic circles.

This exploration of the profession's understanding and knowledge is intended to invite dialog, rather than debate amongst the physical therapists. By offering a new model for an ongoing evolution of knowledge, hopefully a broader cross section of the profession will engage in this fascinating process of inquiry. Within the concluding scenarios for practice, there is the description of the departure from the former clearly delineated subject-object split that prevented a partnering inquiry between the *science* and *art* camps within the profession. The presence of a glossary for common language and a background of context will hopefully create a meeting place for further integration of both the *head* and *heart* of the profession. If so, then the future *evidence* will be clear that physical therapy is indeed not only the profession of, "The Science of Healing and the Art of Caring," but also, "The Art of Healing and the Science of Caring."

Background: Forming Context

Physical therapists construct their base of knowledge to a fascinating process. The number of therapist that formally participating in the critical inquiry process is quite small (800 members in the research section of the APTA's total 63,000 members http://www.apta.org/components/sections/sec_profiles/research_profile). This lack of participation has been ongoing concern of the profession, particularly in the past decade of increased demand for evidence-based outcomes. More troubling than the limited number of formal participants, is the much smaller number of therapists who have critically examined the philosophical foundations of the knowledge base. Examining the assumptions or paradigms that form the foundational physical therapy knowledge is both full of surprises and an essential discipline.

Perhaps when removed from the *survival* mode of formal study, re-examining the foundation may invite a fresh spirit of inquiry amongst therapists. Mere mention of the words "philosophical" or "paradigms" may elicit a conditioned stress response for many therapists. Often linked to the one mandatory research design and statistics course, the motivation was more often that of *survival*, rather than the *intrigue* of exploration and discovery. Revisiting terminology and the relationships of the terms to our clinical reality, may evoke a deeper appreciation of the *art* of science and healing.

Terminology

Again, in order to not only explore both the art of healing and the science of caring, enhancing awareness of emotional responses (i.e., subjectivity) is prerequisite to critical appreciation. Noting your response, consider the following. Rather than isolated objects to be defined, the following words (linguistic symbols) reveal amazing

implications for daily practice. The keys to bringing these foundational stones of knowledge to life: (a) The words' symbolic meanings must be generally agreed upon and understood to give all members of the profession the ability to communicate their findings, and (b) The relationships of these linguistic propositions must be woven intimately into practical, everyday clinical experience (reality). Acknowledging these keys, the first step is to propose working definitions for these words that support the assumptions of the knowledge base of physical therapy.

Terms

A glossary of terms for current and emerging philosophical inquiry.

Philosophy: Consists of our ideas, theories, and views articulated and presented in the clearest way possible (Solomon, 1998).

Metaphysics: The theory of reality and the ultimate nature of all things (Solomon, 1998).

Ontology: One part of metaphysics; the study of the nature of being; an attempt to list in order of priority the various sorts of entities that make up the universe (Solomon, 1998).

Epistemology: What can be known or valid; the study of knowledge, including such questions as, "What can we know?" and, "How do we know anything?" (Solomon, 1998).

Argument: A sequence of assertions or statements to back up a view point or idea; a key to good philosophical presentation (Solomon, 1998).

Problem: A sincere human concern that motivates philosophical speculation and argument (Solomon, 1998).

Criticism: Carefully examining a statement, testing it out, seeing if in fact the arguments for it are good ones (Solomon, 1998).

Paradigm/Worldview: The view of the world that results from the concepts and conceptual framework; what we value; our perspective or lens for understanding reality. Not always consciously aware of, or "blind," to their effects (Morin, In press).

Semiotics: The study of signs and symbol systems that composes patterned human behavior in communications...especially written and verbal (Ogilvy, 2002).

Paradox: A statement or set of statements that are self referential and contradictory and that trigger a vicious circle; that life is larger than the concepts of either/or, and is really both/and (Smith& Berg, 1987).

Holon: Wilber (2000) credits Arthur Koestler with coining the term "holon" to mean an entity that is simultaneously a *part* of some other *whole* and itself a *whole*. Cells are whole, but a part of an organ and composed of parts (molecules) which are composed of atoms, etc.; Integral to the issue of relations and systems; Wilber (2000) describes 20 different tendencies of systems that evolve such as individuals, species, organizations, knowledge bases, or solar systems. Some key tendencies for discussing the evolution or development of knowledge systems are the following: (a) Holons emerge and do so in ascending levels of order (holarchies), (b) Each emergent holon transcends and includes its predecessors, (c) The number of levels of evolution determines the depth of the holon, with the greater the depth, the greater the degree of consciousness, and (d) Holarchies co-evolve since they are related, and this evolution tends to increase the complexity, the ability to differentiate and integrate, the amount of organization and structure, along with a relative increase in autonomy.

Heterarchy: Non-hierarchical maps of organizational structures; hierarchies looping back on themselves; contrary to habitual insistence that there must be a superhierarchy secondary to the pervasive hierarchical paradigm; composed of strange loops and shifting first principles, i.e., the human central nervous system (Ogilvy, 1987).

4 Ways of Knowing: Heron and Reason, (1997) described a human knower as participating in knowing that articulates a world of four interdependent ways: experiential, presentational, propositional and practical.

- 1.) *Experiential* knowing means direct encounter through participation; feeling and imaging the presence of some energy, entity, person, place, process or thing. This includes the creative shaping of a world through the transaction of imaging it and perceptually enacting its forms of appearing.
- 2.) *Presentational* knowing is grounded on images from experiential knowing. Described as an intuitive grasp of the significance of our experience of our world, it is symbolized in graphic, plastic, and musical, vocal and verbal-art forms (i.e. this paper). Metaphors and spatiotemporal forms of imagery (i.e., the human heart as a pump) symbolized forms of our experience with the world.
- 3.) *Propositional* knowing is knowing in conceptual terms. Our descriptions through language of statements and various propositions based on presentational forms, "-disarms are visual shapes of the spoken or written word-and are ultimately grounded in our experiential articulation of a world."
- 4.) *Practical* knowing is knowing demonstrating a skill or competency. The ability to act in purposive deeds based on the other three forms of knowing culminates in practical skills from action. This creates the action paradox Heron (As cited by Heron & reason, 1997) described as, "*We learn more profoundly about our world's when we are more interested in enhancing them with excellence of action than learning about them.*"

A Motor Systems Analogy of the 4-ways of Knowing

An analogy of the systems theory of motor learning in Figure 1 below may help to ground this proposition of four ways of knowing. As the patient experiences the perception of proprioceptive feedback of the initiated motor action, they create an image (affective to imaginal). A “picture” in effect of how they look, move, or are positioned in space. This presentational image grounds the conceptualization (imaginal to conceptual). They use the image to create a symbol that can be manipulated conceptually. Their image becomes a tool for this propositional phase. This conceptual tool allows the propositional cognitive assessment (conceptual to practical) of possible motor strategies and their potential outcomes. They then formulate a practical uppermotor efferent action or strategy producing additional afferent feedback (practical to affective). The cycle begins again and continues as the new action (movement) creates additional afferent feedback. Just as the patient moves through these cycles, so too, does the fully inquiring mind during the new worldview of inquiry.

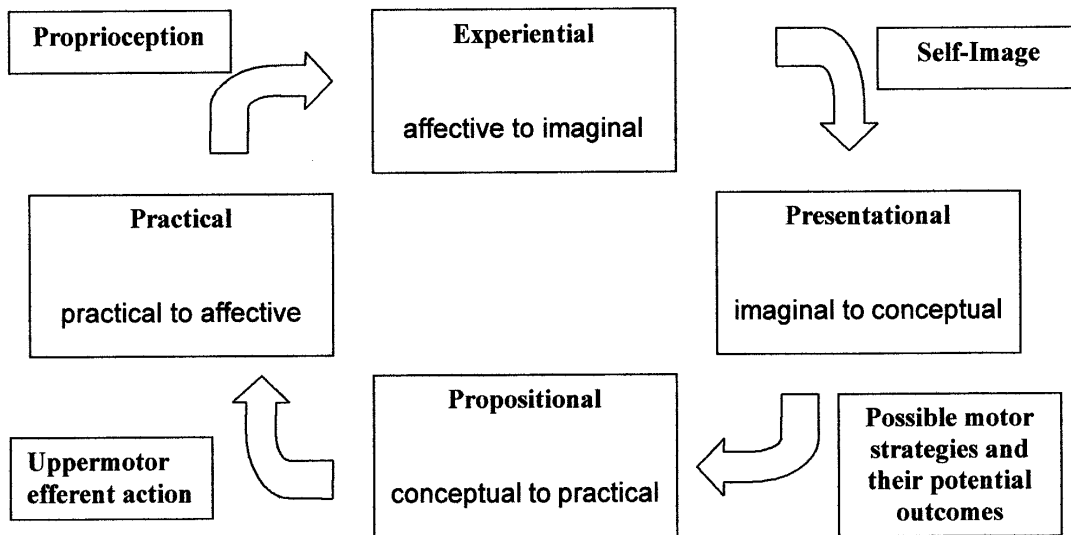


Figure 1. 4-ways of knowing in the human motor system.

While much of the terminology may have been familiar, the shared understanding of meaning will help to insure propositional knowing throughout the remainder of this paper. All of the terms will be used contextually to deepen understanding of relationship between the terms and how the paradigms emerge in the “reality” of daily physical therapy practice.

Relationship to clinical reality

The art of appreciation is manifested in playing with how these words can be interconnected to create the reality of our practice. The implications of adopting each of the two different paradigms will now be explored. The first is the scientific method of the past 300+ years through which most of the western world still views reality. After examining the assumptions, to include their historic and social outcomes, the clinical reality will be described. As a ground of context and a bridge between paradigms, elements of the special journal issue of *Phys Ther* (2001; 81) *Guide to Physical Therapist Practice* will be reviewed. The framework of current disablement models will yield clues to the possibilities a second, new worldview holds for the knowledge base of physical therapy. The new paradigm will be described in terms that weave it into relationship with both the former paradigm and the disablement models of practice.

The Context of Relationship

The Scientific Method

The scientific method has been the dominant western paradigm of the past 300 years. Most modern organizations are structured and operate under this worldview which has brought about tremendous technological and industrial advances. Despite these successes, there are *complex* problems which through discoveries of the method itself, no

longer fit within the paradigm. In physical therapy practice, those *complex* questions include: 1.) What factors influence peak or optimal human movement performance? 2.) Is there really an unbiased clinical intervention? And 3.) What other non-mechanical factors influence human movement that are not examined in the current research methodology? Before examining these questions in detail, a brief setting of historical context is necessary to allow appreciation of the “why” physical therapy views the world as it does.

The 20th-century saw the arrival of the professions that address movement in a therapeutic model. Morin (2001) described the dominant paradigm of inquiry as that of the European Cartesian paradigm. As Morin stated, “This paradigm disconnects subject and object, each in its own sphere: philosophy and reflective research here, science and objective research there... This paradigm determines a double vision of the world, in fact a doubling of the world. One is a world of objects that can be observed, experimented, manipulated. The other is a world of subjects that raise problems of existence, communication, conscience, destiny (p. 23).” The scientist, according to Fay (1996), seeks objectivity as an ongoing response to earlier historical demands of intimidation or to serve as agents for prevailing political agendas.

This objectivity arose within the context of objectivism. Fay (1996) defined objectivism as, “the thesis that reality exists “in itself” independently of the mind and that this reality is knowable as such (p. 200).” He later suggested that the goal of objectivity within objectivism is to look at the world from a god’s-eye point of view without any of the viewer’s presuppositions or interests and to see the world directly as it is. This according to Fay (1996) is the foundation for the “scientific method” composed of

impersonal reports, double-blind tests, controlled observation, and impartial assessment of hypotheses.

Fay (1996) stated the *epistemological* orientation that emphasizes the mind mirroring reality is broadly positivist in nature. He further stated that, "knowledge rests on the ability to perceive cognitively unmediated aspects of reality ("facts"), and to assess explanations of these facts by means of publicly observable, empirical test (p.202)." This perspective presupposes a realist *ontology*, or realism, taken to mean both that reality has its own inherent order, and that a reality exists independent of human perception and cognition. Fay used the analogy of a puzzle to illustrate the principal of realism, and a modification of this analogy may be a useful tool for the clinician unfamiliar with the philosophical underpinnings of the scientific method.

Through the centuries as scientists have discovered the pieces of the puzzle of Reality, the drive was to replicate the pre-existing order so that what one claims to be the case corresponds to what actually is the case. Hence these beliefs would be *true* as they represent copies of mind-independent entities or the One True Picture of reality (the mind *mirrors* reality). Fay (1996) defined *progress* as the scientists getting closer and closer to painting this One True Picture.

Consider the popular board game Battleship® as an analogy for the scientific quest for knowledge. One player seeks to ascertain the reality of the coordinates of the other player's hidden array of various sized ships located on a grid. The ships are of varying lengths, arranged in a specific pattern, with each ship having a differing number of coordinates based on its length. The objective for the opponent is to name individual coordinates, hoping to *hit* a corresponding position of one of the ships. The first player to

map accurately the reality of the other player's grid pattern wins. This presupposes that there is one unchanging grid with an established number of defined entities. All the movement scientist has to do is determine the number and types of shipping (the anatomy and physiology), the laws by which they operate (stimulus-response, feedback loops, training effects, etc.) and their relationship to one another (a different grid for each diagnostic category creates a procedural guide to care). Once all of these have been determined, the clinician would possess the reality and interventions to consistently generate absolute outcomes to insure remuneration. Or so the current *game* instructions would suggest to the physical therapist.

These quantifiable, objective coordinates prevent the introduction of observer/clinician bias or special interest. Either there is a ship at that coordinate or there isn't, "yes" or "no"; "on" or "off"; a dualistic perspective supported by rational, Aristotelian logic. All of these are premises of the game rules of the scientific method. As the basic structure of "reality" is discovered by gradual accumulation of objective theories, a correspondence theory linking truth and scientific progress is developed. Following this analogy, a theory or fact is said to be objective if it fits on the grid. Fay (1996) stated that individuals or methods are said to be objective if they eliminate the subjective elements that might not fit neatly on the grid, and would otherwise prevent achieving objective *truth*. Those observations that don't fit *coordinates* are deemed by rationalization as *irrational* if they conflict with beliefs, doctrines, or theories and are closed to dispute as error or artifact. If it isn't in the *rules*, it isn't *true*. Through the decades, instructors, students and clinicians have come to value most that which is labeled as true or objective.

The scientific method can be seen as valuing only that “reality” which flows from a linear, binary Aristotelian proposition of concepts (symbols), or what was described earlier as “propositional knowing.” The paradigm is both reductionistic and mechanical in orientation. Break the item of investigation into smaller, simpler components and describe how each “part” works and is constructed. There is little room or tolerance for the other three ways of knowing: experiential, presentational and practical. Rather, “reality” has only to be uncovered, not made by the knowers’ perspectives and frameworks. True beliefs are copies of mind-independent activities (the correspondence theory of truth). Passion and spirit, the basic elements of *art* and *caring*, have no place within the scientific method’s axiology of disinterest. In summary, as Fay (1996) claimed “persons or methods are *objective* if they eliminate subjective elements (p.204).”

Continuing the game board analogy, the scientific method discovered an anatomical *reality* long ago that created a large, destabilizing crack in its foundation of assumptions. That *hit* on the grid is that within the human sensory system only two percent of the resources are able to receive direct, external environmental stimuli (Morin, 2001). This means that 98 percent of the neurocerebral system resources transmit, construct, and interact indirectly (subjectively) with interpretations of perceived external reality... how is it that this universally accepted fact is not problematic to the method? Since early in the last century, modern science has continued to observe "peeks" behind the grid of reality that suggest the original game instructions do not match observed phenomena of the objectivist version of the game of Reality. Quantum physics upended the game board, and has since been supplemented with information, chaos, and complexity theories. These various theories postulate that all inquiry is inevitably

perspectival. Morin stated that the instruments of measurement, as well as the observer, introduce *subjectivity*, in addition to the risk of error from random perturbations or *noise* that is inherent in all transmission of information.

Morin (2001) further stated that, "Our systems of ideas (theories, doctrines, ideologies) are subject to error and, in addition, they protect errors and illusions contained in themselves." And, "Doctrines are self-enclosed theories, absolutely convinced of their truth and invulnerable to all criticisms that shows up their errors (p. 19)." In the process of addressing the human movement system by partitioning the inquiry first from the entire system of the human, and then reducing it into more manageable components, the therapists find themselves awash in informational parts, but struggling to create a synthesis that applies to the whole patient. The Battleship® board does not contain a *limited number* of ships, but *varying numbers of varying sizes*. Examples would include the plasticity of the nervous system, the role of endocrine system, nutritional status, or motor learning. The coordinates are not two-dimensional, but multidimensional with varying orientations and relationships such as the cultural, emotional, mental, environmental, genetic, and chaotic randomness are but a few of the dimensions that impact movement. On top of that, every new *rule* discovered, modifies all of the previous rules, as well as creates new rules.

Suddenly, the realization that humans are epistemologically limited becomes apparent when it is understood there is no One True Picture of reality. Science cannot be sure of the nature of such an order, or if an order even exists. Fay (1996) argued that rather than fall into the despair of relativism and rejecting outright the possibility of objectivity, a more accurate "best guess" at reality would be to reconceptualize the term

"objectivity." The principles of the new paradigm, built on the epistemology of fallibilism, will set the foundation for exploring reality through a worldview of critical intersubjectivity. Before making that transition, a review of some of the social implications and clinical practice realities of the scientific method is in order.

The ability to reflect on how the current knowledge of human movement has been acquired is a valuable exercise and appears to be unique to the human species. So often in the hurried pace of modern life, the necessity to focus on a narrow, somewhat myopic segment of what is *known* risks the loss of context, which may reveal a different view of *reality*. Have physical therapists been lulled into valuing a frame of reference that has been accepted as the "truth". This mechanical reductionist paradigm is socially *evidenced* behind the oft repeated cries for, "functional outcomes," "evidence based," "objective," and, even by the names of the respective professions (*physical, occupational, speech* etc. therapies) which compartmentalize or reduce the knowledge into a *part*.

In today's accelerating pace of change and complexity there is the danger of developing almost a *herd* mentality. Representative of a type of cognitive conformity, this conforming is evident in the titles of journal articles and continuing education courses, and can lull an entire profession into a false sense of solace and *knowing*. If such a perspective is collectively embraced in unmoving paralysis or rigidity, it has the potential to produce hubris and a defensive, or outright rejection, of inquiry methods other than the scientific model. Such positioning also creates the potential for ethical dilemmas within the professions. The bias of which studies are funded, permitted, and then eventually published can be influenced by multiple factors. Physical therapy runs the risk of focusing inquiry to meet the needs of corporations, third party payers, and

equipment manufacturers rather than out of patient advocacy. Without careful vigilance, the “subject” can quickly become a *part* or cog of an organization, dehumanizing the *caring* aspect of physical therapy. Additionally, in the increasingly diverse multicultural patient pool there are demands for sensitivity and recognition of the cultural influences on human movement. These include, but are not limited to age, gender, ethnicity, faith, and race. The complexity of human movement creates complications that very quickly exceed the intellectual simplification worldview and cloud the heart of caring.

Ascending into the holon of individual practice “reality” from the larger social holon, there are even more problems. The individual therapist has experiential knowing that how things are at home before the clinic work begins affects her or his management of the patient. In the clinic, the patient too brings in financial, social, ethnic and psychological factors that either undermine or supplement the therapist’s best efforts. The therapist’s unending search for the continuing education course that provides a universal solution is eventually abandoned so most continuing education attendees are in their mid-30’s or younger. The draining effect of this linear, unidirectional approach to offer the right mechanical *part* for the patient who presents with a multiplicity of complex components leads to frustration and fatigue. Add to that the increasing pressure of practicing under heavy productivity burdens, and ultimately symptoms surface in the form of burnout, job-hopping, or personal health challenges. The tired, spent individual therapist is part of the holon of the entire profession. The clamor at the national level with physical therapists seeking their identity and place in the world of medicine hologrammatically mirrors the plight of the individual’s search for identity. Fortunately,

within the physical therapy profession's own self-inquiry there is a way out from the constraints of the crumbling foundation of the scientific method paradigm.

The Bridge...the Disablement Models

Transitioning to a new worldview has the potential to be disorienting, frightening and uncomfortable. The emerging new paradigm is based in part on the Quantum Theory of Relativity. Neil Bohr, pioneering physicist, is reported to have said, "If one is not upset by quantum theory, one does not fully understand it." With that warning in mind, the disablement models and other principles of the *Guide to Physical Therapist Practice (Guide)* (The Guide 2001; 81) will form the footings to bridge the exploration into what Morin (2001) termed the new paradigm's "sea of uncertainty."

Utilizing the *Guide* (The Guide 2001; 81) in such a manner conforms to its stated purpose:

The Guide to Physical Therapist Practice is an evolving document that will be systematically revised as the physical therapy professions knowledge base, scientific literature, and outcomes research develop and an examination intervention strategies change. The Guide is the structure on which scientific evidence will be fastened, and, in turn, the *evidence will reshape the structure* [italics added]. (p. 25)

Another word for reshape is "transform", which is the ultimate outcome of changing worldviews: trans-forming the structure. The disablement model has been reported to typify "physical therapist practice and is the model for both understanding (propositional knowing) and organizing practice (practical knowing)" (p. 27). The disablement models contain keystone principles that when applied in practice will be accommodated most comfortably in the new paradigm.

What is disablement?:

The concept of disablement refers to the "various impact of chronic and acute conditions on the function of specific body systems, on basic human performance, and on peoples functioning in necessary, usual, expected, and personally desired roles in society." Thus, the disablement model is used to delineate the consequences of disease and injury *both at the level of the person and at the level of society* [italics added]. (p. 27)

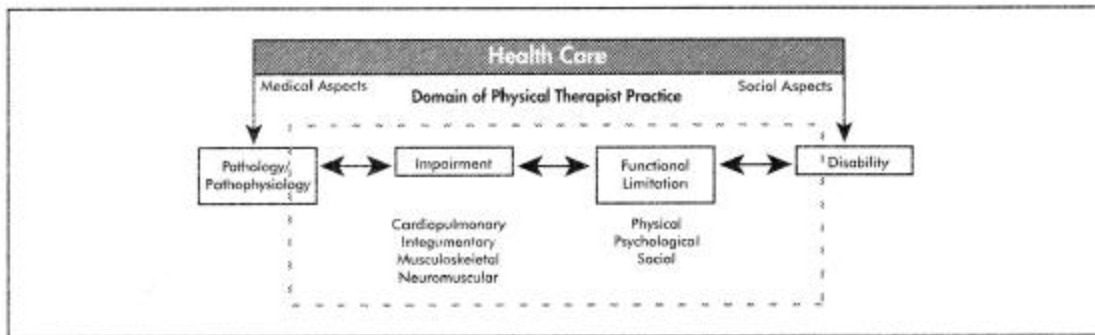
Or, in other words it represents a holon. The models use four broadly defined terms:

- 1.) **Pathology:** the state that is (a) characterized by a particular cluster of signs or symptoms, and (b) recognized as abnormal by either the patient/client or the practitioner as "abnormal."
- 2.) **Impairment:** Any loss or abnormality of structure or function.
- 3.) **Functional limitations:** The restriction of the ability to perform a physical action.
- 4.) **Disability:** The inability or restricted ability to perform an action usually expected in specific social roles (in a specific sociocultural context and physical environment.)

Together these four terms create the core of the Scope of Physical Therapist

Practice within the Continuum of Health Care Services. See Figure 2.

Scope of Physical Therapist Practice Within the Continuum of Health Care Services and the Context of the Disablement Model*



*Adapted with permission of the American Physical Therapy Association from Guccione AA. Physical therapy diagnosis and the relationship between impairments and function. *Phys Ther*. 1991;71:499-504.

Figure 2. Pending permission for publication from *Phys Ther* 2001; 81; 29.

The model is relatively linear, deterministic and "simple" in design and dynamics.

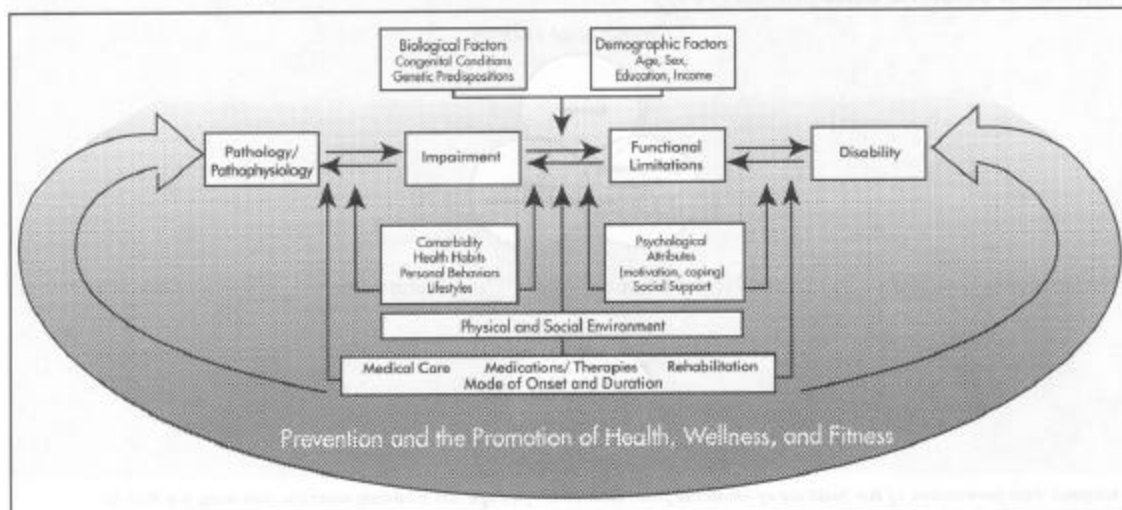
A good fit within the old paradigm. As will be evident shortly, the more interactions involved per term, coupled with circular or recursive loops, the "messier" disablement becomes and the less comfortable the old paradigm begins to *feel*.

In the disablement model “any single disorder may disrupt the anatomical structures and physiological processes of *one or more systems*, (The Guide, 2001; p. 29)” and also that:

“Many of the signs and symptoms that are important to the physical therapist-and many of the conditions that affect the person's ability to function-are not associated with a single active pathology/pathophysiology, nor are they always found to have an impact exclusively on a single system or the system of origin.” (p. 29)

The straight line determinism of the old paradigm begins to crumble as the myriad of relationships and complicating factors blur the certain edges of the scope of practice. Consider how the objective measures of practice dissolve into the weave of a more complex expanded disablement model of Figure 3.

Figure 4. An Expanded Disablement Model, Showing Interactions Among Individual and Environmental Factors, Prevention, and the Promotion of Health, Wellness, and Fitness^a



^aAdapted with permission of the American Physical Therapy Association from Guccione AA. Arthritis and the process of disablement. *Phys Ther.* 1994;74:410.

Figure 3. Expanded Disablement Model. Pending permission for publication from *Phys Ther* 2001; 81; 32.

The Guide (The Guide, 2001) elaborates on the uncertainty and loss of linear causality that this expanded model describes in clinical practice. Three examples are (emphasis mine):

- 1.) *The origin of some impairments is often unclear.* Poor posture, for example is neither a disease nor a pathological state; however, the muscle shortening and capsular tightness associated with poor posture are still clinically significant (p. 22).
- 2.) Functional limitations... The division of the basic activities of daily living and instrumental activities of daily living ... to "successful performance of complex physical functional activities, such as personal hygiene and housekeeping, typically requires integration of *cognitive and affective abilities* as well as physical ones (p. 22).
- 3.) Disability... *Changing the expectations* of the patient, family or caregiver and social context... *may help to diminish disability as much as* supplying the patient with the system devices or *increasing the patient's physical ability* to use them (p.31).

The defined lines of practice blur further when an even broader perspective is adopted.

Where do physical therapists establish the boundaries of practice when the holon of the expanded disablement nests itself in relation to the health-related quality of life (HRQL) and larger, quality of life (QOL) models? See Figure 4.

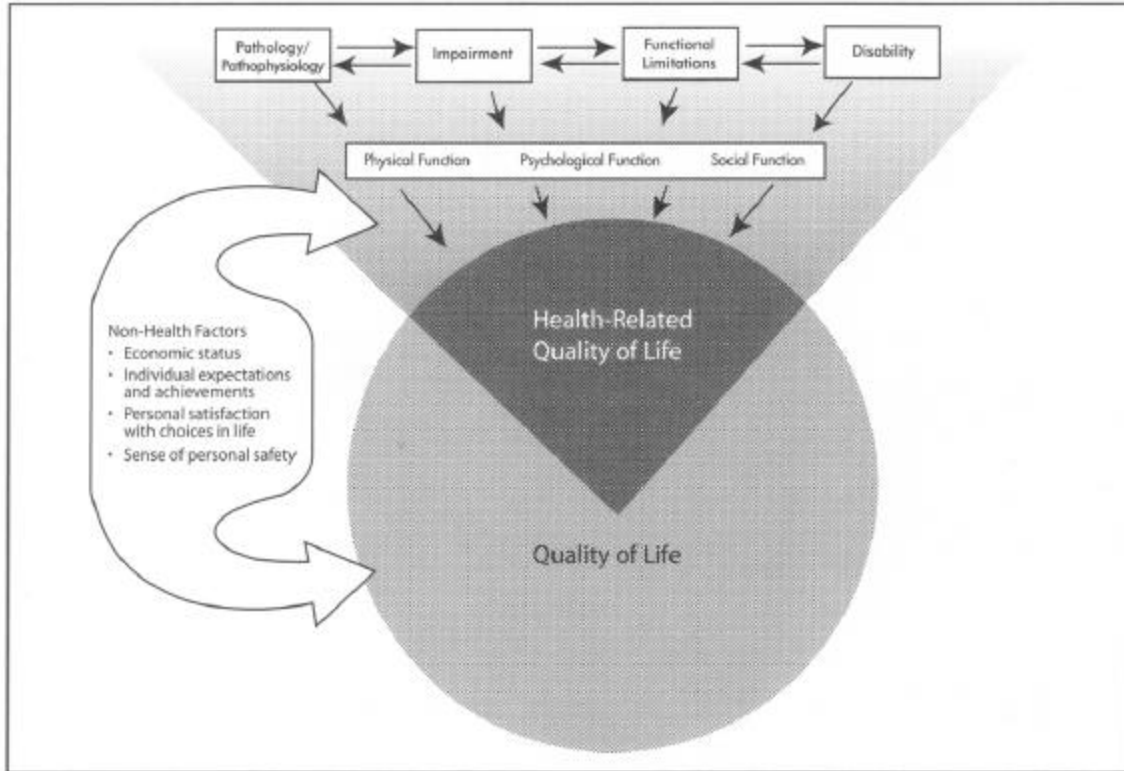


Figure 4. Health Related Quality of Life and Quality of Life Models. Pending permission for publication from *Phys Ther* 2001; 81; 33.

The Guide (The Guide, 2001) hints at these additional factors and how they ultimately influence the human movement system:

Comorbidity, health habits, personal behaviors, lifestyles, psychological traits (e.g. motivation and coping...finding meaning) and social interactions and relationships also influence the process of disablement...Each of these factors can be modified by prevention and the promotion of health, wellness and fitness.

HRQL can be said to represent the total effect of the individual and environmental factors on function and health status... Other “non-health” factors that are typically not included in definitions of functional limitation and disability contribute to an individual’s sense of well being- and to both overall quality of life and health-related quality of life. Such factors include economic status, individual expectations and achievements, personal satisfaction with choices in life, and a sense of personal safety (p. 32-33).

How does the physical therapy practice hold these complex and complicating factors within the old paradigm? Not very effectively, and consequently it is imperative that the *new* (the past 50 years) emerging paradigm of complexity be adopted in both theory and practice. The complexity paradigm founded on fallibilism comfortably contains both the *art* of healing and the science of *caring*.

The Complexity Paradigm

Pause to consider the knowing experienced by the process of critical inquiry up to this point. What emotions, concerns, anticipations are being experienced? Again, not to lapse into an endless spiral of introspection, but to acknowledge that affect (subjectivity) influences reason (objectivity) upon which rests this process of inquiry. If objectivity is not isolated, disinterested manipulation of objects, what might it be?

Any "negative" emotional reactions experienced may point to what Fay (1996) described as, "The specter of epistemological nihilism which objectivist fear will result from giving up objectivism with its positivist epistemology and realistic ontology has no particular foothold here (p. 211)." A reconceptualization of "objectivism" will ameliorate any such experience of fear or discomfort. A reconceptualization of objectivity can begin by examining the problems of the old concepts and assumptions of the new concept.

Two problematic aspects of objectivism lay the framework for the fallibilist account of knowledge. As Fay (1996) stated:

Facts don't speak for themselves; nature is never encountered in an unvarnished way; experience, sensations, and other perceptions require *a priori* conceptual resources in order to occur; and the language in which we think and articulate our thoughts is inherently permeated by our conceptual commitments. Perspectivism has taught us that any theory of how the cosmos works necessarily occurs from within one conceptual scheme or another, and consequently the deep patterns science seeks to ascertain are as much imaginative constructions as they are discoveries. (p. 204)

The heart of semiotics and how it influences experience and practice is contained within that quote. As humans, all inquiry is nested within holons of conceptualization. The new paradigm celebrates the ability to step outside existing paradigms and still operate within them. The *and/both* view of the new, not the *either/or* of the former binary paradigm.

The second point Fay made is that in studying human movement the scientist must consider the intentional phenomena related to the movement. This evaluative dimension demands understanding the rationality behind intentional acts or motions. Rationality means being conscious that human motion occurs within a system (disablement model and HRQL) in which a rational account lays behind both the intentional act of the patient, and the explanation of that act by the observer. Because human motion is not the linear, mechanical sequencing of interactions between inert objects, the positivist ideal of refraining from making evaluative judgments about events and objects must also be abandoned. (Fay, 1996) The worldview, intentions, and emotions of the observer influence not only the “objectivity”, but the event as well. This naturally produces a break from the Aristotelian logic of dualistic "yes/no" delineations because every observation differs based on the rationality of the observer and the subject. Hence, the intra-rater reliability never equals "1" because every observation affects both the rater and the rater's perspective of the rationality of the observed (the act of observing affects the propositional knowing of all subsequent observations).

The Fallacy of Affirming the Consequent is a third element of fallibilism. To the researcher and clinician this points to the always present "p" in the results section of any study. Briefly summarized, Fay (1996) asserted that even if all empirical observations are in accord with a scientific hypothesis, observers can never know for sure, or "prove" a

scientific theory true. This inability to know whether any theory is true or false, even ones for which there are excellent reasons to believe they are true, may in deed be false.

Fay describes this conclusion as,

...the heart of the philosophical thesis called fallibilism. According to fallibilism, nothing about the world can be known for certain; certainty is not something which science can provide us. This is not because science is currently flawed, a weakness correctable by better equipment, better tests or better hypotheses. It is an inherent feature of the epistemology of science and scientific reasoning itself: no amount or quality of empirical confirmation or disconfirmation is sufficient to guarantee ascertainable truth or falsity. (Fay, 1996. p.208.)

This uncertainty warns against hubris as history demonstrates the fate of so many past prized theories - a flat earth; the irreversibility of certain forms of cardiac disease; long term immobilization certain ligamentous grafts - none of which presently are held beliefs of the majority. Fallibilism does not negate the belief that an independent structure of reality exists in the cosmos, just that scientists can never be sure they have replicated such a structure with their theories. Returning to the Battleship® and Fay's (1996) mapmaking analogies as a form of *presentational* knowing may be beneficial in reshuffling these weighty *conceptual* propositions. Fay illustrated that if by analogy one likens science to mapmaking, rather than Battleship®, then fallibilism offers a reconceptualization of objectivity.

While realism represented the possibility of knowing the One True arrangement of the Battleship® grid, consider the task of a cartographer in creating a map. Philosophically, the only way to replicate or *map* an object or event that would serve and anticipate all of the possible needs and uses of the map reader would be to include information that accounted for all the past, present and future uses of the observed. In other words, the map would have to replicate reality, which we have demonstrated to be

problematic. Fay (1996) argued that rather than abandon mapmaking because no pre-existing map exists to be discovered, the cartographer subjectively selects aspects of a particular terrain that will lend the map to being either more reliable, explanatory, detailed, or serviceable to the user. The cartographer realizes the aspects of terrain are not simply given, but rather their interests and the uses dictate the focus of the map.

Likewise, if the scientist is being funded by a vested third party or attempting to please a dissertation committee, either will affect the focus of their *map* of a human movement study.

Also, the mode of representation is a function of both the purposes and how the mapmaker perceives the terrain. So too, whether the researcher has a family member who has a personal movement challenge and the investigator is seeking a solution for that challenge, vs. *just* completing an assigned requirement will alter the purpose of the study. If the researcher views patients as self-determined agents of creative possibilities or as unmotivated, disinterested cogs in the gears of a military-industrial complex will also *color* the study. Finally, the cartographer understands that there are no contours of the terrain that exist independently of other represented contours. (See Figure 4) The investigator acknowledges not only the interrelationships of the social, cultural, and historical *contours* of the observed on the movement of the observed, but also their (the researcher's) own mix of related *contours*. The intelligibility of the study then becomes not a property of its correspondence with some independent reality, but is a matter of comparing various hypotheses (*maps*) in terms of their ability to enlighten and empower both the clinician and the patients. Heron and Reason (1997) argued emerging research lays claim to validity through the congruence of the four aspects of the extended

epistemology (the map) where action not only consummates the prior forms of knowing, but is also grounded in them.

What does all of this demonstrate about the notion of objectivity? Having rendered realism, positivism, and the ideal of *disinterestedness* as unacceptable, objectivity cannot be tied to the notion of *truth* or the idea of an "objective truth." If objectivity is to remain an ideal, "objective" cannot mean "objectively true." If objectivity is reconceptualized not to apply to the *outcome* of the research, but rather as a property of the process of inquiry itself, then the *method*, not the *conclusions* of scientific analysis, is what is objective. Fay (1996) stated, "Required for a reconstructed construal of objectivity is a shift from substantive to procedural adequacy (p.212)." This shift would define a process of inquiry as objective when the investigators believe they can never be certain they are right and maintain sufficient detachment from their own commitments to subject them to examination, while remaining open to the possible merits of other viewpoints. Fay calls on practitioners of this form of objectivity to positively seek out other possible opinions and to actively solicit the reactions of others toward their claims that theirs is the most plausible alternative going. Thus, objectivity requires that investigators be willing to respond to future discoveries, analyses, or criticisms, as an inquiry can only be objective in the sense that it is an ongoing *process*. This open, ongoing social process of discovery leads to an objectivity which Fay termed "*critical intersubjectivity* (p. 213)."

Critical intersubjectivity offers a paradigm to describe the hallmarks of a 21st century researcher. See Table 1 for a comparison of the two paradigms. Embracing its own inherent principle that it is only a current "best guess" epistemologically for

movement scientists, the paradigm does offer a refocus on the process of inquiry and includes a sound means for negotiating complexity and systems theories that is lacking in the traditional scientific method. Often termed the complexity or relational paradigm or dynamic systems theory paradigm, this new paradigm contains the assets of the old paradigm, but offers a way to embrace the complex circularity of the expanded disablement model and HRQL models. Set out as directions, rather than goals to be achieved, these hallmarks can help to define or redefine the physical therapy knowledge base in a creative, open, and unthreatening manner. Now both the *parts* and how they are *related* play equally valuable roles. No single hierarchy of reality orders experience or practice; rather the heterarchy of multiple interrelated hierarchies must be constantly held in perspective.

<u>Old Paradigm</u>	<u>New Paradigm</u>
Reductionistic, disjunctive and abstracting	Relational, conjunctive and integrating
Mirrors the <u>one</u> reality (positivist)	Ongoing, unfolding <u>realities</u> (fallibilist)
Mechanical – parts oriented	Relational - ecological
Object related - simplified	Subject related- complex
Exclusive	Inclusive
Linear, Aristotelian “either/or”	Circular, paradoxical “and/both”
Knowledge for knowledge sake	Application of knowledge
Analytic and orderly	Comprehensive and chaotic
Competitive, head intelligence	Community, soul and body
Straight forward	Dialogic

Table 1. Worldview Properties Chart.

Again, be aware of not only intellectual responses to this section, but also any subjective/emotional experiences, seeking to understand the deeper held beliefs or paradigms that foster both *positive* and *negative* responses. That awareness is the first hallmark of a 21st century human movement professional.

Because there is no one “truth,” critical intersubjectivity invites an atmosphere of open exchange that can accommodate a broader range of theories to include those emerging from integrative medicine. No longer having to construct a façade of the impersonal, omniscient third person, self-aware observers can entertain and address these questions of analysis as posed by Fay (1996):

What does this analysis do? To whom is it expressed and why? To whom in what language is it available? What narrative or other reportorial conventions does it follow? Who is permitted or unable to respond in what name and with what affect? In answering these questions investigators must be particularly mindful of the ways any analysis involves the use of power in which investigators define and the limit the identity of those understudy by venturing to speak for them. (p. 218)

Elements of these questions are present in most studies. Unfortunately, in the quest for objectivism the result often produces limited bits of information not easily synthesized into practice. The role of power dynamics in science and academia may exclude others from participating or being heard at all. In an intersubjectivity environment not only is there awareness to the obstacles barring participation, but also contrary or different perspectives are actively sought out and engaged in the process. This returns to the social implications and questions of the prevailing paradigm. How are less traditional or complementary methods and techniques of inquiry supported? In what way have the growing minority sectors of the patient population been included? If when they were, did a majority or a minority representative conduct the study? How is qualitative or narrative

study included or accepted? In what way is the experience and history of the *partial* observer documented and recorded?

Fay (1996) describes these types of questions as the dimension of critical intersubjectivity that might be called *accountability*. Accountability is composed of both cognitive commitments to and the positionality of the inquiry. He emphasizes that to be accountable, "critical recognition must pervade the scientific inquiry throughout and not just be confined to its starting point (p. 216)." Historically this disclosure has been limited to the preface of the work, when in fact, "the entirety of an inquiry is shot through with its conceptual and evaluative premises," and, "critical recognition must show itself in the work itself and not just in its preamble (p.216)." He also advocates self-awareness of what assumptions lie behind the investigators concept of evidence and their selected standards of significance. Most inquiry is now limited to such disclosure of the scientist's commitments to their contact information and place of affiliation or employment.

Other issues to consider within the world of movement science inquiry include questions posed by Fay (1996), "who gets to speak, who is acknowledged as an authority and why, whose concerns are responded to, who has access to the material, and how these authorizations both constrain and enable various forms of social relation and behavior (p. 218)." If a goal of such inquiry is intended to serve a multicultural population, then it must reject the definition of objectivity as meaning "objectively true" and reconceive objectivity to mean "critically intersubjective." The physical therapist must be open to others, engage them, seek out and hearken to their observations, discoveries, and criticisms. Fay (1996) proposed that manner be not in a sanitized,

parochial, mono-cultural environment, but as open-minded, responsive to evidence, accountable, and criticism seeking.

Such a manner can also evoke justified concerns that in adopting an open system of inquiry, science ends up with a hopeless jumble of incoherent voices and perspectives that yield no utility. Critical intersubjectivity adopts a middle point position of moderation between such an extreme and the current *sterile* environment. Therefore diversity is acknowledged *and* coherence are maintained by a more extensive, but not overly stated level of accountability.

Other concerns raised about critical intersubjectivity equate the act of identifying preconceptions in a study as the study then necessarily being biased or prejudiced, and therefore of no utility. While some preconceptions may be fixed and unalterable, most are provisional and revisable, merely requiring the investigator to as Fay (1996) said, “employ cogent arguments based on evidence carefully sifted for bias (p. 214).”

Critical intersubjectivity does not require betoken agreement either. On the contrary, by inviting contrary opinion and criticism, the method supports a healthy environment for ongoing disagreement in a civil, objective fashion. Every theory is not accepted as good as any other theory. Rather at any given moment *any* theory might be acceptable, but the current evidence suggests some other theory as the present *best*. As Fay (1996) pointed out, “ ‘ anything is possible’ does not mean ‘ everything has to be taken seriously’; nor does it mean ‘ there is no basis for judging one theory better than another (p. 215).” Out of this web of concepts, fluidity and uncertainty, surfaces the key question. How does this propositional knowledge get expressed in the practical knowing of clinical practice?

Toward a New Practice

Adopting such a paradigm of inquiry will require the creation of new tools and methods of investigation and practice. In order to deal with complexity and its circularity, the therapist of the future will have to develop not only the left-brain linear, logical skills, but also foster the right-brained skills of emotional intelligence, multidimensional perspectives, and be at ease with uncertainty. The *Guide* (The Guide, 2001) offers some additional skill requirements of the physical therapist:

1. Physical therapy is a dynamic profession with established theoretical scientific base and widespread clinical applications in the restoration, maintenance, and promotion of optimal physical function. (p. 21)
2. Restore, maintain and promote not only physical function, but optimal wellness and fitness and optimal quality of life as it relates to movement and health. (p. 21)
3. When the physical therapist to determine which impairments are related to the patient's functional limitations, the therapist must determine which impairments may be remedied by physical therapy intervention.... The task or the environment also may be modified so that the task can be performed within the restrictions that the patient's condition imposes. These two approaches focus on an "enablement" rather than remediation of the "disablement," and they may be characterized as the classical physical therapist response to the disablement process. (p.31)
4. The complexity of interconnections among the four components of the disablement model is indicative of the knowledge of the physiology and pathophysiology that each physical therapist must bring to bear in addressing impairments, functional limitations and disabilities.... (p. 30)

Empowered within this new paradigm of complexity, the physical therapist will be better able to address the needs for support and relief of suffering bring patients to their practice. Future clinic scenarios will deal with many new and increasingly complex challenges. As the entire society is transformed by this new paradigm of complexity,

standard presentations will slip farther and farther away. It is impossible to project exactly what the complex and complicating issues will be, but the emerging “reality” of this short list of factors suggests the challenges to be faced in practice:

- Increased diversity of patient populations
- Limited financial accessibility to services
- Decreasing margins of profitability
- The aging demographic tidal wave of baby boomers
- The cumulative effects of increased stress
- Loss of the health benefits of increased social isolation
- Increasing flood of information and transdisciplinary research

This lists represents untapped opportunity for expanding and delivering the application of the physical therapy base of knowledge. There are also numerous new tools awaiting utilization to support such a mission.

Emerging technology offers incredible potential for harnessing the relational characteristics of multi-variable analysis of both narrative/subjective data and quantitative measurements. Nanotechnology and microphysics are revealing previously unknown interactions and manifestations of body-mind-spiritual relationships.

Qualitative and narrative inventories and scales are being developed with increasing reliability and validity. The Internet offers a platform for more open participation, criticism, and the emergence of a "collective intelligence" that incorporates and synthesizes emerging information from a host of disciplines rather than the insular, turf restricted patterns of old. Movement science can weave together the threads of physical

science, psychology, sociology, theology, and anthropology to restore the ever-changing fabric of reality into a meaningful *context* from which to practice.

Conclusion

“We should learn to navigate on a sea of uncertainties, sailing in and around islands of certainty.” - Edgar Morin (2001, p.13)

As physical therapists step into the future in search of objectivity, the current best *myth* of understanding, that of critical intersubjectivity, offers some suggestions. That to serve a multicultural clientele the physical therapist must be mindful of their personal epistemology and how that influences their practice. The therapist must continually examine through critical self-reflection their personal epistemology, as well as the collective way of *knowing* of their profession. For as a holon, that is whole unto themselves and a part of a greater whole, both influence their practice. Such a method of self-reflection will also promote the “art” of healing in balance with scientific analysis. What are the therapist’s and patient’s other three ways of knowing that account for the clinical “reality?” What social-psychological issues, emotional imbalances and spiritual states are feeding into the impairment, functional limitation and disability? Maintaining what Morin (2001) described as meta-perspectives will ensure the therapist remains cognizant of not only information, but in the most comprehensive and compassionate manner possible. Such a perspective will collectively enjoin the profession to maintain the ethical responsibility to make care available and applicable to as wide a spectrum of patients as possible as well. Clearly, in this era of global awareness and increasing complexity, the opportunities for discovering and supporting healing or wholeness demand a new way of knowing.

The intention of this paper was to develop some common conceptual language and increase the opportunity for more therapists to participate in the formulation of the physical therapy practice base of knowledge. Consistent with the complexity paradigm, these concepts are not a final truth, but one more chapter in the exciting story of physical therapy. Humans working together to make others, and themselves, whole. Hopefully, empowered with a new framework, the profession can continue to engage in an expanded dialog so that, “The *Guide* is the structure on which scientific evidence will be fastened, and, in turn, the evidence will reshape the structure (The Guide, 2001, p. 25).” As the evidence for the new paradigm continues to be incorporated by physical therapy, the very structure and domain of both the theory and the practice will be transformed.

Through the rigor of this complex, creative method of inquiry, lies the best opportunity for physical therapy to be the profession of, “The Art of Healing and the Science of Caring.”

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