ADULT LEARNING AS RECURSIVE PROCESS

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For almost a full century researchers and practitioners in the field of adult education have searched for a comprehensive theory of adult learning. Recent reviews of adult learning theories (e.g., Merriam, 1987; Merriam & Caffarella, 1991), however, state that a single unifying framework which addresses all aspects of adult learning may be impossible to develop. Instead of seeking a single unitary framework, current efforts at theory building in the field of adult education are probing for interrelated concepts and principles that elucidate adult learning phenomena.

In this article we argue that viewing adult learning as a recursive process can extend and clarify theories of adult learning. To illustrate our viewpoint, we highlight three recursive processes which are common to the experiential learning operations postulated by Kolb (1984) and the triarchic intelligence processes formulated by Sternberg (1988). The interactions within and among these three recursive processes accentuate complexities of adult learning that remain implicit, but unexplored, in models of adult learning.

Recursive Processes

Models describing recursive processes (Cottone, 1989; Hoffman, 1981; Luckhurst, 1985; Selvini-Palazzoli, Boscolo, Cecchin, & Prata, 1980; Varela, 1979, 1989) provide excellent frameworks for clarifying some of the many complexities

inherent in adult learning. In his discussions of recursive processes, Keeney (1983) distinguishes between lineal and recursive causality. Lineal causality has its theoretical roots within the 19th century conceptions of the physical sciences that describe how discrete, unitary "causes" create specific "effects" through unidirectional "flows" of "energy."[1] A basic metaphor in lineal causality is the scenario involving a person kicking a rock (Hoffman, 1981). The rock moves a distance that is predictable from the force of the foot, the size of the rock, and surface on which the rock rests. Mechanisms used to explain adult learning in terms of lineal causality tend to use such constructs as "motivating forces," "predictive factors," or "trigger events."

Recursive causality, which is sometimes referred to as "circular" or "interactive" causality, has its roots in the biological and computer sciences. Recursive causality purports that multiple influences are linked to multiple outcomes. The outcomes, in turn, affect the initial starting conditions through informational "feedback" loops as described in the following example. A basic metaphor for "circular" causation is the spectacle involving a person kicking a dog (Hoffman, 1981). The dog's movements (e.g., snarling, barking, cringing, etc.) in response to the threat of an oncoming foot provide feedback that modifies the response of the kicker. Modifications in the kicker's response (e.g., adopting a more passive stance), in turn, change the dog's "response." In a recursive system sorting out "causes" and "effects" is like trying to solve the ancient riddle of the chicken and the egg because "causes" influence "effects" and those "effects" influence further "causes." As noted by Allen and Sheckley (1992), descriptions of "causes" and "effects" are frequently reflections of the assumptions used by the observer and are not necessarily attributes of the phenomenon observed.

Unlike lineal systems which imply that adult learning is "caused" by factors like "cognitive styles" or "stages of development" recursive views emphasize that informational feedback loops linking "causes" and "effects" influence adult learning through multiple levels of interaction. For example, a teacher's statement "causes" an adult learner to question her own conclusions about a topic. This self-questioning then "causes" the student to challenge the point under discussion. The student's argument, in turn, "causes" the teacher to modify the initial premise. The clarification "causes" the student to reformulate a presupposition. The new supposition then influences the teacher's next argument, and so on. Many other "causes" also contribute to this interaction (e.g., reactions of other students, past relationships between this teacher and student, the teacher's or student's personal

[1] As noted by Keeney (1983) the nature of our language requires the use of metaphors to convey our depictions of recursive systems. To reflect this limitation, we have extended the conventions guiding use of quotation marks to include ordinary words whose meanings we intend to be taken as metaphorical and not literal.

feelings of triumph or embarrassment, etc.). To map learning cycles accurately where every action in the chain is different from ones taken previously by the same actor, models of adult learning need to outline in more complete detail the informational feedback loops that influence learning activities through multiple levels of interaction.

Keeney (1983) also notes that in any sequence of actions presumed causality may be viewed as either lineal or recursive depending on the "scope" or "frame" used to analyze the sequence. For this reason descriptions of a behavior, like that of an adult enrolling in a college course, may be analyzed with a lineal "scope" in terms of a single "cause" like receiving an unemployment notice. With a recursive perspective, this same behavior would be portrayed as a connected pattern that included multiple contexts, time perspectives, and interactions among more or less discrete "elements" within those contexts at various points in time. The recent unemployment notice, a lifelong ambition to work in a certain profession, a prior history of academic success, a pledge made to a dying parent, expectations of future success, curiosity about a particular topic, a need to escape from a deteriorating marriage, and an aspiration for more money would all be woven into one recursive pattern such that alteration of any one aspect of the pattern would interactively affect all other aspects of the pattern. For present models of adult learning to describe such an interactive pattern, they have to be unpacked to account for multiple contextual influences (Clark & Wilson, 1991) over multiple time frames.

Finally, descriptions of recursive systems, in general, require "second order" levels of recursiveness to depict interactions between the system being described and complementary systems. To capture the multiple interactions involved in adult learning, contemporary theoretical frameworks could be expanded to describe adult learning in terms of a "system of systems" in such a way that each system is shown to function recursively within itself and to interact recursively with other complementary systems.

In the following section of this paper we begin describing adult learning as a recursive process by spotlighting interactive systems present within the depictions of intelligence and learning formulated respectively by Sternberg (1988) and Kolb (1984). In the final section, we underscore common features of these highlighted systems that can be used as starting points for future discussions of ways adult learning can be conceptualized in terms of recursive process.

Recursive Processes in Theories of Experiential Learning and Triarchic Intelligence

Experiential Learning Theory. In his landmark volume, Kolb (1984) describes experiential learning as ". . . the process whereby knowledge is created through the transformation of experience." (p. 38) Throughout his discussions of the experiential model, Kolb identifies multiple levels of recursion. For example: "The relationship between apprehension and comprehension is dialectic in the Hegelian sense that, although the results of either process cannot be entirely explained in terms of each other, these opposite processes merge toward a higher truth that encompasses and transcends them." (p. 107) In a helpful clarification of the relationships among the many interactions involved in experiential learning, Kolb sketched a smooth flowing cycle (Kolb, 1984, p. 42). Like all models that are designed to simplify complex phenomena, the Kolbian model appears deceivingly simple. We believe that the intricate processes Kolb packed into the unpretentious learning cycle need to be highlighted so they may be used to enrich future discussions of adult learning theory.

Embedded within the straightforward experiential learning map so familiar to cooperative education practitioners are two subsystems that depict ways recursive processes operate in adult learning. The first subsystem, the grasping dimension of experiential learning, describes how adults acquire information either through *apprehension* (i.e., immediate and direct contact with concrete experience) or through detached *comprehension* of abstract concepts. The second subsystem, the transforming dimension of the model, describes how information is personalized either through *intention* (i.e., reflective observations) or *extension* (i.e., active experimentation).

Kolb (1984) uses a circle surrounding these two crossing axes to depict an even flowing experiential learning process. The implication that might be drawn from a quick review of this smooth cycle is that learning is lineal and predictable. Kolb (1984), however, argues cogently that learning is an unpredictable enterprise that is best understood as a tumultuous process.

> Ideas are not fixed and immutable elements of thought but are formed and re-formed through experience. . . Learning is. . . a process whereby concepts are derived from and continuously modified by experience. No two thoughts are ever the same since experience always intervenes (p. 26).

Triarchic Theory of Human Intelligence. As outlined earlier in this journal, Sternberg (1988) discusses intelligence in terms of *"mental self-management* — the manner in which we order and make sense of events that take place around and within us" (author's original emphasis, p. x). His Triarchic Theory illuminates three interactive mental processes (i.e., componential, experiential, contextual) that are not usually included in discourses about adult learning theory. From our perspective, consideration of these recursive interactions would improve current models of adult learning.

Briefly, in the componential aspect, Sternberg outlines the relationship of intelligence to the internal world of the individual in terms of metacomponents, knowledge acquisition components, and performance components. For example, when adult learners are faced with term paper assignments, they would use metacomponents to decide on the topic, to monitor the writing, and to evaluate the final product. During the course of the writing, they would use knowledge acquisition components to do the research. To accomplish the actual writing, they would use performance components.

In discussions of the experiential aspect, Sternberg explicates the relationship of intelligence to the experience of the individual by addressing ways novel situations are automatized into routine action. For example, an individual who is "experientially intelligent" will quickly transform the act of using a new word processing program into a routine exercise.

Sternberg (1988, p. 65) depicts the "context of intelligence" by describing mental activities involved in thinking through actions that best fit a particular situation. Individuals with contextual intelligence will use their mental abilities to adapt to situations, alter situations to their liking, or move on to new situations which they find preferable. In the term paper assignment noted above, "contextually intelligent" learners would either: (a) figure out what the teacher "really wanted," (b) negotiate with the teacher for a more interesting topic, or (c) drop the course and find a subject more suited to their goals.

Levels of Recursion in Adult Learning

The triarchic theory of intelligence (Sternberg, 1985, 1987, 1988) and the experiential learning theory (Kolb, 1984) offer complementary accounts of intelligence and learning. As we view them, the two theories have several common elements that are especially useful for sorting out complexities of adult learning that are not fully addressed in current theories. We group these commonalities into three systems that interact recursively within themselves and also interact recursively with each other system. In deference to both theorists, we label the systems: (a) the constructed knowledge system; (b) the reflective system; and (c) the adaptive system.[2] Our attempt to outline these three systems is not an effort to replace any component of either the experiential learning or triarchic model; rather, our discussion represents an effort to delve into the two theories and make more explicit common recursive processes that can be used to enrich future discussions of adult learning theory.

The Constructed Knowledge System. Within the constructed knowledge system, recursive relationships exist between experience and the mental processes used to make sense of experience. Simply stated, what learners "know" influences what

[2] These three captions are designed as short labels for highly complex processes. Longer captions that more accurately represent the full complexity of these systems were not used in order to preserve simplicity and ease of discussion.

they "experience" and, conversely, what they "experience" influences what they "know." Through this recursive interaction, learners often "impose" meaning on the world by using "executive" processes (Sternberg, 1988) to "construct" what the nature and extent of the problem to be solved is before figuring out what information will be used to understand and solve the problem. When learners prejudge a problem in this way, they establish "boundaries" that guide subsequent mental processes they use to solve the problem.

According to Keeney (1983) this recursive "meaning making" process involves five steps. First, learners make distinctions between "this and that." Next they describe the distinction just made using their own descriptive frameworks. In this way, learners shape that which they are describing. Third, learners order, calibrate, punctuate, and prioritize their distinctions using their own values (e.g., they decide that "this" is more important than "that"). Finally, they either receive confirming feedback that reinforces their distinctions, calibrations, and punctuations or they encounter disconfirming feedback that leads to reevaluation of their "meaning making" process.

The idea of "constructed knowledge" is well supported in the fields of psychology (e.g., Kelly, 1955) and philosophy (Keeton, 1992).

> Students of contemporary philosophy will recognize the kinship of these ideas with those of . . . conceptualistic pragmatists . . . Knowledge is not something inherently and intuitively grasped by some mysterious power of rational apprehension. Nor is it a photographic process in which the human brain copies what is outside of it. It is rather a capacity to recognize patterns of experience, to seek out clues, to piece them together into a coherent system and to develop hypotheses accounting for all that we have experienced, and thus to control in some measure what happens by using the array of those hypotheses to guide our own conduct (Keeton, 1992, p. 7).

Individuals reflecting on the experiential nature of adult learning sometimes assume that "concrete experience" is an objective, "first order reality" (Watzelick, 1976) that initiates subsequent learning activity. From a recursive perspective, and inherent in Sternberg's (1988) concept of "metacomponents" and Kolb's (1984) descriptions of "apprehension processes," the "experiences" learners encounter are not unchanged streams of concrete sensory events; rather, they are "second order realities" (Watzelick, 1976) constructed by filtering environmental inputs through sensory and neurological processes used to make sense of the experiences.[3]

[3] The scientist and philosopher Edmund Montgomery correctly noted in the late 1800's that the construction of experience in and of itself involves multiple levels including the reception of stimuli on sense organs, focusing consciousness on the incoming stimuli, interpretation of the stimuli, and decisions to act on the stimuli. A full discussion of these levels of construction is beyond the scope of this paper.

For example, when individuals encounter a crying baby (first order reality) they process information selectively and recursively through multiple cognitive/affective meaning filters. This selective filtering may take the form of questions: Is she hurt? Will he cry harder if I pick him up? Is the mother nearby? Am I responsible for the baby? Are others around to care for the child? What would happen if I left? As information is filtered through this questioning process, the individual constructs an experience (second order reality) that guides future aspects of the encounter. In this case, the "experience" that enters the learning cycle is not an unfiltered, concrete experience of a crying baby; rather, it is a "constructed experience" that reflects levels of recursion among cognitive, personal, moral, and social meanings used to interpret the situation of a crying baby.

Conceiving adult learning in terms of a constructed knowledge system has important implications for theoretical discussions of adult learning and for practical applications in the design of cooperative education programs. "With such a conception, learning cannot be simply a matter of memorizing or 'acquiring' knowledge. Instead it is a constructive process that involves actively seeking meaning from (or even imposing meaning on) events" (Candy, 1991, p. 270).

We believe that the next generation of adult learning theories need to explain in more detail the recursive processes involved in the constructed knowledge system used by adult learners. Once the particulars of the constructed knowledge system are outlined more explicitly, practitioners will have better roadmaps to use as guides to develop programs that value learners' perspectives and enable students to refine the personal constructs they use to "construct" their worlds. This emphasis on valuing the perspectives of individual learners, already apparent in the work of theorists such as Friere (1989), needs to be expanded to other arenas within the field of adult education.

The Reflective System. As stressed by Sternberg in his discussions of intelligence and depicted by the transforming dimension of Kolb's (1984) learning model, reflection is an essential component of adult learning. As we view it, "reflection" itself is best understood as a set of interactive processes that combine to form a recursive system. This system performs three pivotal functions in learning activities: (a) checking on the validity of constructed experience, (b) tempering action with judgement (e.g., "think before you act"), and (c) informing judgement through action (e.g., "let's try it and see what happens").

In most situations learners use the reflective system to assess the validity of their "constructed experience." Interactions between the reflective system and the constructed knowledge system enable learners to determine if an experience actually "fits" the meaning frameworks they used to "construct" the experience. Recursive interactions between the constructed knowledge system and the reflective system occur along a continuum of highly reflective to minimally reflective engagement. In the highly reflective mode of interaction, all mental

processes are subject to close scrutiny. For example, in a highly reflective mode all aspects of constructed experience would be carefully considered to: (a) bring to the surface and criticize the tacit understandings that have grown up around repeated experiences; (b) make new sense of unique or unfamiliar situations; or (c) keep alive, in the midst of action, multiple views of a situation (Schon, 1983). As suggested by Sternberg's (1988) process of automatizing novelty, however, not every constructed experience is subject to such high scrutiny. At the minimally reflective end of the continuum, certain routine problems, like deciding on the best route to use in driving home from work, are solved with little reflection and little interaction with the constructed knowledge system.

According to Mezirow (1991) the reflective system also involves an internal recursive relationship between reflective judgement and reflective action. Reflective judgement involves: (a) assessment of assumptions, and (b) evaluation of ways those assumptions act as meaning constructs used to understand and solve problems. To complement reflective judgement, reflective action involves bringing ideas into action, assessing actions as they occur, or thinking back on how actions may have been accomplished better. Reflective action interacts recursively with reflective judgement as described in the following example. Using our earlier example of kicking a dog, a reflective action sequence might include "if — then" considerations: "If my reflective judgement that this snarling dog is about to attack is correct, then I better back off and get into the house quickly." According to Mezirow (1991) reflective action may also involve a split second pause in the midst of the incident to reassess the situation and ask "What am I doing wrong to incite this attack?" or "How could I do a better job of bringing this dog under control right now?" Reflective action may additionally involve *ex post facto* interactions with reflective judgement in which an action is contemplated after it was completed (e.g., "Now that I am safe in the house and this spectacle is over with, how could I have handled that dog better?").

In addition to Sternberg and Kolb, other theorists (e.g., Freire, 1989; Mezirow, 1991) have acknowledged the importance of reflection in adult learning. These same theorists have also delineated specific aspects of the reflective process. A full understanding of the recursive nature of reflection, however, still needs to be explicated. We believe that a full delineation of the interactive processes within the reflective system — and between the reflective and constructed knowledge systems — would help to flesh out the skeletal considerations given to reflection in many models of adult learning. A comprehensive framework that outlines the interactive nature of reflection will also enable cooperative educators to expand their strong emphasis on helping learners sort out the differences between the cooperative education experience per se and the learning that is derived from the cooperative education experience.

The Adaptive System. A phenomenon of great interest in the social sciences is the interaction between individual behaviors and the environment in which the behaviors occur (Bandura, 1978). Kolb (1984) follows this social science interest as he explains that learners need to develop "adaptive flexibility" in order to maximize learning opportunities when they interact with valuing, thinking, deciding, and acting environments. Following this same line of social science inquiry, Sternberg (1988) describes how "contextually intelligent" individuals employ thought processes that enable them to interact effectively with different environments.

Within the social sciences, theorists (e.g., Bandura, 1978) discuss ways environments (e.g., a traditional college classroom) "pull" for specific behaviors (e.g., listening and taking notes). Following this principle, Sternberg (1988) suggests that learners interact with the contextual "pull" of learning situations either to: (a) adapt to the "pull," (b) modify the situation so it has a different "pull," or (c) select another situation with a more amenable "pull." We believe that analyses of environmental "pulls" needs to be extended to include recursive interactions and to clarify ways differing adult learning situations "pull" for particular learning behaviors.

We believe that future theories of adult learning need to discuss in greater detail the nature of interactions between adult learners and environments that either promote or deter their learning. To begin this discussion, we outline an "adaptive system" that includes recursive relationships between individuals and the valuing, thinking, deciding, and acting learning environments charted by Kolb (1984).

In valuing environments (e.g., situations involving a discussion with individuals from another culture) learners are confronted with unfamiliar situations, different beliefs, alternative perspectives, and new interpretations of familiar events. During interactions within valuing environments, individuals usually find themselves challenging the constructed knowledge system that they use to order and delimit their world. When flexing to meet the demands of valuing environments, individuals use their reflective systems to "place" unfamiliar situations within existing meaning schemes or to "create" new meaning schemes which make sense of divergent experiences (Mezirow, 1991). Due to the characteristic "pull" of valuing environments, learning interactions within valuing contexts usually focus on understanding the meaning of a constructed experience in terms of values, feelings, morals, and relationships. The dynamics involved in interactions with valuing environments are well documented in the work of Gilligan (1982).

In thinking environments (e.g., a graduate seminar) learners critically review evidence, assumptions, and logical distortions. Individuals adapt to the demands of thinking environments by critically analyzing the meaning schemes that provide foundations for their constructed knowledge system. These environments also challenge individuals to use their reflective system in order to: (a) contemplate how and why meaning schemes are constraining, (b) ruminate on ways to

reformulate basic assumptions so that meanings are more inclusive, and (c) justify how a problem was defined. In response to the characteristic "pull" of thinking environments, learners respond with attempts to validate meaning using rational, consensual evidence. Both Mezirow (1991) in his recent work on critical reflection and Brookfield (1987) in his discussions of critical thinking insightfully depict the analytical processes involved in recursive interactions in thinking environments.

In deciding environments (e.g., an assignment calling for a decision about which metal to use in a design for a jet engine) learners are challenged to employ the constructed knowledge system to establish presuppositions for action in the form of "if - then" statements. This environment also challenges persons to use their reflective system in order to contemplate the possible distortions in the presuppositions guiding action (Mezirow, 1991). In a deciding environment, learners use their adaptive system to focus on their presuppositions in order to sort out and decide upon the best action in a specific situation. Schon's (1983) work on reflective practice elaborates on this adaptive process.

Finally, in acting environments (e.g., a situation requiring actions to calm an irate customer) learners are challenged to use their constructed knowledge system to inform task oriented, problem solving behavior. In these action oriented environments individuals are also challenged to use their reflective system to assess procedural assumptions and to make actions consistent with assumptions. One's adaptive system focuses interactions between individuals and the "pull" of this particular environment on how to accomplish an action best in a specific situation. The processes involved in action environments are informed by the research on transfer of training (e.g., Baldwin & Ford, 1988).

In an astute commentary on theories of adult learning, Clark and Wilson (1991) point out the overemphasis placed on the primacy of the individual in the adult learning process and the accompanying lack of attention given to the importance of context. Attention to the role of the adaptive system brings this critique into sharper focus by describing interactions between individuals and specific learning environments. The important role social context plays in the adult learning process needs to be elaborated in future discussions of adult learning theory.

Once the full nature of adaptive learning processes are specified, cooperative educators will have another avenue to follow in their search for ways to improve adult learning programs. By describing the different skills learners must develop to interact effectively with different learning environments, models that define contextual influences on learning could provide explicit frameworks for cooperative education programs to use in combining classroom instruction with job experiences so that learners develop skills necessary to interact with valuing, deciding, acting, as well as thinking environments.

Summary

In this paper we have highlighted recursive systems within the theories of Kolb (1984) and Sternberg (1988) in order to spell out ways in which thinking about adult learning in terms of a constructed knowledge system, a reflective system, and an adaptive system could improve theory and practice in the field of adult learning. From a theoretical perspective models using these three recursive processes would bring into focus many of the highly complex and interactive processes involved in adult learning. Such theoretical models would also provide more intricate roadmaps to guide cooperative educators as they design learning programs that best address the learning needs of cooperative education students. Finally, and from our perspective most importantly, recursive perspectives provide a compelling rationale for adult learning programs to value the personal experiences of learners as a foremost component of any educational activity.

References

Allen, G. J. and Sheckley, B. G. 1992. Lineal and Recursive Perspectives on Change: An Ecological Model Describing the Development and Amelioration of Agoraphobia. In *Self Change: Social, Psychological and Clinical Perspectives,* eds. Y. Klar, J. D. Fisher, J.M. Chinsky, and A. Nadler. New York: Springer Verlag, pp. 115-136.

Baldwin T. T. & Ford, J. K. 1988. Transfer of Training: A Review and Directions for Future Research. *Personnel Psychology* 41:63-105.

Bandura, A. 1978. The Self System in Reciprocal Determinism. *The American Psychologist* 33:344-358.

Brookfield, S. D. 1987. *Developing Critical Thinkers.* San Francisco: Jossey-Bass Publishers, Inc.

Candy, P. C. 1991. *Self-direction for Lifelong Learning.* San Francisco: Jossey-Bass Publishers, Inc.

Clark, M. C., & Wilson, A. L. 1991. Context and Rationality in Mezirow's Theory of Transformational Learning. *Adult Education Quarterly* 41(2):75-91.

Cottone, R. R. 1989. The Third Epistemology: Extending Mauturana's Structure Determinism. *The American Psychologist* 17: 99-109.

Feire, P. 1989. *Pedagogy of the Oppressed.* New York: Continuum.

Gilligan, C. 1982. *In a Different Voice: Psychological Theory and Women's Development.* Cambridge, Massachusetts: Harvard University Press.

Hoffman, L. 1981. *Foundations of Family Therapy.* New York: Basic Books.

Keeney, B. P. 1983. *Aesthetics of Change.* New York: The Guilford Press.

Keeton, M. T. 1992. Edmund Montgomery: Frontier Scientist and Philosopher. Speech delivered at the Elisabet Ney Museum, Austin, Texas, March 18.

Kelly, G. A. 1955. *The Psychology of Personal Constructs.* 2 Vols. New York: Norton.

Kolb, D. 1984. *Experiential Learning.* New Jersey: Prentice Hall.

Luckhurst, P. 1985. Resistance and the "New" Epistemology. *The Journal of Strategic and Systemic Therapies* 4:1-13.

Merriam, S. B. 1987. Adult Learning and Theory Building: A Review. *Adult Education Quarterly* 37:187-198.

Merriam, S. B. & Caffarella, R. S. 1991. *Learning in Adulthood.* San Francisco: Jossey-Bass Publishers, Inc.

Mezirow, J. 1991. How Critical Reflection Triggers Transformative Learning. In *Fostering Critical Reflection in Adulthood: A Guide to Transformative and Emancipatory Learning,* J. Mezirow and Associates. San Francisco: Jossey-Bass Publishers, Inc.

Schon, D. 1983. *The Reflective Practitioner.* San Francisco: Jossey-Bass Publishers, Inc.

Selvini-Palazzoli, M., Boscolo, L., Cecchin, G., & Prata, G. 1980. Hypothesizing, Circularity, Neutrality: Three Guidelines for the Conductor of the Session. *Family Process* 28:255-268.

Sternberg, R. J. 1985. *Beyond IQ: A Triarchic Theory of Human Intelligence.* New York: Cambridge University Press.

Sternberg, R. J. 1987. *Beyond I.Q.: A Triarchic Theory of Human Intelligence.* Cambridge: Cambridge University Press.

Sternberg, R. J. 1988. *The Triarchic Mind.* New York: Viking Penguin Inc.

Varela, F. J. 1979. *Principles of Biological Autonomy.* New York: Houghton Mifflin.

Varela, F. J. 1989. Reflections on the Circulation of Concepts between a Biology of Cognition and Systemic Family Therapy. *Family Process* 28:15-24.

Watzlawick, P. 1976. *How Real is Real?* New York: Vintage Books.