

Letter from Jerusalem #1 6 July 1997

This letter is written from the Shoresh Hotel, just outside Jerusalem, overlooking the Judean hills. It is a beautiful setting, just far enough off the Tel Aviv to Jerusalem motorway that you cannot see or hear the cars. The Shoresh is the setting for the annual conference on Structural Cognitive Modifiability, the theory advanced by the psychologist, Dr. Reuven Feuerstein. The conference opens tomorrow and runs for two weeks. I thought that in this letter I would say a few things about the theory of Structural Cognitive Modifiability (SCM), why it is important to the quality movement, to education in general and why I am here. I hope to find the time during the next two weeks to post a series of letters, provided I get some feedback to suggest that these informal reports are welcome.

The latin verb, 'cogito', literally, "I think", is the root of a number words in the English language, ranging from commonly used words, like "recognize" and "incognito", to technical words, such as the one appropriated by psychologists, "cognitive". Trying to figure out how the brain works and understanding what is going on when we speak, when we solve problems, when we react and when we learn, has been a long term project of mankind. Our understanding of this area or topic underlies all our approaches to the raising of children, the management of other people, our abilities to persuade others to a course of action, in short, all interactions among people. Understandings and misunderstandings of cognition, how it develops and how it is fostered, underlie all our approaches to education and to training.

In the last half century there has been a tremendous growth in the amount of research devoted to this field. On the one hand there have been the psychologists, probing how people seem to respond to various stimuli. At the other extreme have been the neurphysiologists, who have, using marvelous tools of investigation, probed for correlations between activities in various brain locations and mental activity. I cannot begin to name all the fields of specialty which have contributed to our understanding, in artificial intelligence, mathematical modelling of thought and reasoning processes, or in brain surgery. Every day I learn of something I did not expect. For example, three days ago, just as I was about to leave London for Israel, I learned that there exists a group of people who have been examining the effect of learning to interpret music upon the ability of children to learn other subjects. As soon as I get home and have good access to the internet, I expect to look them up and see what they have to say.

In my studies, thus far, the contributor who has impressed me most is Reuven Feuerstein. In his work I find a solid theory, specific practices which put the theory to work, a rich set of experimental verifications (over 1000 reports) and an infrastructure for the support of those who are applying the method in over thirty or so countries. Last year at this and other conferences I met people from Latin America, from Africa, from Europe, from North America and even from India, each of them reporting on what they were doing with the theory of SCM in their own countries.

Now, just what is the theory of SCM? The theory has several basic postulates:

- 1) The human brain is infinitely plastic. That is, it is capable of modification as to its 'cognitive structure'.

The phrase 'cognitive structure' refers to the way the neurons have developed a set of interconnections that governs the way we approach the processing of information. According to SCM, there are no limits on how much this structure can be modified.

2) All humans must respond to stimuli or signals from their surroundings and, based on their interpretation of those signals, decide how to respond. We often think of this as 'problem solving', though most of the activity associated with responding may be carried out at a subconscious level.

At any moment in time, people differ greatly in how they respond to stimuli. According to the theory of SCM, these differences are due to the cognitive structure of the individual person and since cognitive structure is infinitely modifiable, no one is 'locked into' a particular structure. In particular, ideas such as the IQ are denied. With proper mediation, the cognitive structure of anyone can be improved and the ability to respond, sensibly, to stimuli can be improved.

Feuerstein's demonstrations of his theory have been given in several fields:

a) In the case of Down Syndrome children, he has demonstrated in hundreds of cases, that he could bring them to a functioning level where they were able to compete, intellectually, with 'so-called normal' people, in school, in places of work.

b) In the case of severely traumatized children, the children found alive in the Holocaust camps, he demonstrated how to rescue them and return them to normal, productive lives.

c) He has produced significant changes in autistic children.

d) One of the most dramatic cases involves a boy, now 15 years of age, whom I met here last Summer. This lad, at birth had a brain tumor and in order to save his life, the Doctors decided they had to remove, completely, the right half of his brain! His mother was told he would be a vegetable, but at least he would be alive. At age nine he began to speak, but the psychologists continued to insist he would never achieve much. His mother brought him to Dr. Feuerstein. When I first met him over lunch, I had no inkling of his background. I thought he was here because his parents were studying as I was. He seemed to me no more 'odd' than other teen-agers I have known. We laughed and joked at lunch. I was surprised when I learned his story. I hope to see him again here this year. They tell me he is now learning to read, write and speak Hebrew! Think of that...half a brain missing and he does what many of us find difficult to do.

e) About ten years ago people began to wonder if these methods, applied to children with such difficulties, could be made to work such wonders, what would be the result of applying them to 'normal' children?

One experiment involved high schools in Israel, where a group of students was given "Instrumental Enrichment" (IE), a technique for correcting cognitive deficiencies. After graduation, these students went to work and in four years time had to serve in the Israeli army. On entrance to the Army

they were given a battery of tests, the same as other recruits. The youngsters who had had exposure to IE showed up significantly better than the rest of the population.

f) When there was a sudden immigration of the Ethiopian Jews, it was found that, because they had no written language, the children were wonderful at listening and learning via aural input. However, lacking the use of an alphabet, they were very deficient in abstract reasoning. This problem was diagnosed using a method called LPAD (Learning Propensity Analysis Device) and corrective exercises developed to enable these immigrant children to survive and prosper at the higher levels of education where abstract reasoning is so important.

Well, that's enough for now. Tomorrow the classes begin and I shall start my studies of the LPAD. I have heard rumors that the session will begin with a short visit by Mr. Netanyahu. This program of research and education has now been recognized by the Israeli Government. My experience with big government in education makes me doubt that this comes under the heading of 'a good thing'.

I hope these comments will provide the basis for a better understanding of why this subject is important.

Myron Tribus

PS Here is a picture taken with "Alex". The entire right half of his brain is missing, but he carries on sensible conversations. So much for the existing theories of psychology!



Letter from Jerusalem #2

July 7,1997

Last night after I downloaded my e-mail, my system crashed and I lost all the messages. I saw as the messages scrolled by that there were several relating to the last letter, so if you said something important (like take me off this mailing list) please resend it.

Today we had the opening ceremonies for the 18th Annual Conference on the two basic theories, Structural Cognitive Modification (SCM) and Mediated Learning Experience (MLE), with their two applied methods, Instrumental Enrichment (IE) and Learning Propensity Assessment Device (LPAD). There are 233 people attending the conference, representing 33 different countries.

The ceremonies included remarks by Mr. Netanyahu, the Prime Minister. He spoke of the importance of education in this new era and then went on to describe his experience at a nearby military base. There he met with some down syndrome men, who had been mediated by Feuerstein's methods and were now serving in uniform in the Israeli Defense Forces. He spoke of the pride these men had in being able to wear the uniform and to take up their duties. He also spoke of his gratification at the acceptance of these soldiers by the military command. At one point he said, "I had great difficulty containing my emotions as I saw and talked with these down syndrom afflicted men."

Natanyahu also said, "A country should be judged by how it cares for the most vulnerable of its citizens."

As part of the opening ceremonies, Dr. Feuerstein said, "Instrumental Enrichment has been tested for a very long time on a very large population, of great variety and has demonstrated that regardless of the source of cognitive damage, be it from the culture shock of immigrant children, damage from physical injuries, the trauma of child abuse or extreme poverty, parental neglect ... regardless of the cause, the cognitive functioning of people has been increased. Experience tells us that this increase is without limit."

This potential for continuous improvement of cognitive capabilities is, therefore, a personal right and it is the duty of government to guarantee this right to every child."

Reuven Feuerstein gave a long after lunch lecture on the foundations of mediated learning and how he saw all elements (SCM), (MLE), (IE) and (LPAD) fitting together. He also decried the practice of some people to merely copy some of the materials of IE, sell them as pamphlets and then tell teachers that all they have to do is "apply them" without benefit of theory, training or supervision. He made the point that successful use of SCM, MLE, IE and LPAD required an understanding of both the theory and the practice. Theory alone would not suffice, nor would just the tools and techniques.

Feuerstein made another point: We need to understand cognitive processes, not just behavioral outcomes. Thus, MLE aims to help learners increase their cognitive competencies, not just master certain subject matter. There is no interest in scoring progress; the objective is to help the learner improve cognitive competencies.

Cognitive capabilities are at the heart of all that we do that involves anything above the most primitive reactions. Therefore, any true education will have as its focus the development of cognition. Each teacher should have in mind a long range concern, using the subject matter not as an end in itself but as a way to increase the thinking power of the student.

All four aspects, SCM, MLE, LPAD and IE take into account that nothing gets done except by a combination of both emotion and cognition. Thus in working with students, teachers have always to keep in mind the emotional aspects of the activity. A key ingredient for the learner is the development of knowledge of competence. It is not a good idea for the teacher to say, for example, "That is a good job, Johnny" Rather the teacher should say, "Johnny, you seem to be getting the hang of it, don't you think? Would you like to show me another example?" What Johnny needs is to understand, himself, that he is gaining competence. Recognition of this by the teacher, reinforcing the self understanding, is much more useful than praise which shows no real ability to judge progress.

In the late afternoon we had a very interesting lecture from Rafi Feuerstein, the son of Reuven Feuerstein. The subject was the LPAD, but we began with a discussion of the history of testing, or at least that part of the history that pertains to the conference. We recognize three different ways of thinking about how learners react to stimuli.

S->R Skinner's stimulus-response. The organism is like a machine, responding to stimuli as Pavlov's dogs did.

S->O->R Piaget's consideration of how an organism (learner) responds to a stimulus. The organism makes a decision on how to respond and learns thereby.

S->H->O->H->R Feuerstein's Mediated Learning in which a human interposes himself or herself between the stimulus and the organism and well as between the organism and response. Mediator helps the learner to learn from the experience.

(The term "organism" originated because Piaget began as a biologist)

Feuerstein's view is that while children learn many things by direct exposure to stimuli, (as is done in the Montessori school system, for example, where the children are exposed to all manner of devices which help to form concepts of area, volume, length.) this is not the process whereby they formulate their concepts or their problem solving strategies. They learn from adults the value of being methodical, of controlling impulse, of looking for relationships, in short, cognitive functions.

I found this last observation of considerable interest because on the way over I was reading in C. I Lewis book, "Mind and the World Order", often referenced by W.E.Deming. In this book C.I.Lewis takes quite a bit of time discussing the issue of where we get our concepts.

We reviewed the difficulties of testing in a society in which there are so many cultural and economic differences. Attempts to produce tests which were

"Culturally Unbiased" or "Culture Independent" have failed. So long as the objective is to place the students on some sort of scale (Bell Curve,ugh) it will not work. The LPAD has an entirely different intention. The objective is, for every student, to understand the COGNITIVE PROCESS, that is, how the student attacks a problem. Based on the analytical techniques of the LPAD, cognitive weaknesses can be identified and exercises developed to correct them. Do not think that this is just for 'under-achievers' (though it certainly helps them.) When I took some of the tests, I discovered certain deficiencies in my own approach, deficiencies I have been able to cover up for over 70 years!! Continuous improvement is possible in anything.

Well, enough for tonight. We have a full day tomorrow. I doubt I shall be able to keep up a pace of one letter per day.

Myron Tribus



Reuven Feuerstein

Jerusalem Letter #3

Tuesday, 8 July 1997

Today we really got down to work. Yesterday was filled with ceremonies, overviews, general introductory stuff. Today we separated into different groups concentrating on different subjects. Last year I studied Instrumental Enrichment, IE 1. This year I am studying the Learning Propensity Assessment Device (LPAD 1).

LPAD is a method for assessing the propensity of a student to learn. It differs in both method and philosophy from conventional psychological testing. In conventional psychometrics, the purpose is to obtain an "objective" measure of the students attainments. In a typical test, the person administering the test is supposed to be passive, giving only a standardized set of instructions and conducting the test in a standardized way. By such standardization, it is intended that students may be compared with one another. The different scores are stratified according to age, etc. These standardized tests do create a number of problems, especially if one or another socio-economic or racial group does not do too well. The tests have been criticized as being culturally biased. Attempts to remove this bias have not been successful. Attempts have also been made to produce tests which were "culture free", but this has not been successful either.

The LPAD approach is different. While the focus of conventional psychometrics is results, the focus of LPAD is on process and continuous improvement. (Sound familiar?) In the LPAD approach students are given various kinds of puzzles to solve and they are observed by the assessor who studies not what they do but rather how they do it. Given a problem to solve, the learner's activities are examined with respect to three phases:

1. Input phase... the taking in of information.
2. Elaboration phase... the analysis of the information, the production of new information and new questions.
3. Output phase... the production of a result.

For each phase Feuerstein has identified a set of 'cognitive deficiencies'. There are eight commonly found difficulties during input. For example, here are three of them.

1. Blurred and sweeping perception
2. Unplanned, impulsive and unsystematic exploratory behavior.
3. Lack of, or impaired receptive verbal tools that affect discrimination (e.g., objects, events and relationships are not labeled.)

Tests are given and the observer is taught to recognize when one or another of these cognitive deficiencies is observed. The mediator then develops exercises and activities to remedy the deficiency.

For example, suppose that deficiency #2 is thought to be present. One of the reasons people will engage in a random approach to solving their problem is that they do not have a clear view of the problem, that is, in terms known to quality practitioners, the learner does not have a clear aim. Without a clear aim, the learner does not know what he or she is trying to do and cannot fashion a plan to do it.

The lack of an aim, in turn, may result from the learner not being convinced that the task is something he or she wants to do. Feuerstein's way of dealing with this situation is to devise tests and challenges that are fun to do. We all know how many people become addicted to cross-word puzzles. In the same way, Feuerstein's tests have a quality that attracts all manner of people. I can attest that once you start working them, it is hard to stop!

In addition to being attractive to the point of addiction, the puzzles are designed to provide exaggerated examples which play to the various cognitive deficiencies.

Because the person administering the test is using the results as the basis for coaching and teaching, the students soon lose all fear of the testing process and, surprisingly, enjoy taking these tests. The person giving the test becomes a mentor. The objective, as I said above, is to find ways to improve, not to judge.

While the LPAD is concerned with diagnosis and remediation, Instrumental Enrichment is concerned with mediated learning. MLE is characterized by three unique features:

1. The intentionality of the mediator... to improve cognitive processes, not as in conventional instruction to provide a specific content of knowledge or know-how.
2. The mediate the development of meaning... to help the learner understand the utility and meaning of what has been learned.
3. Transcendence... that is, concerned for the future development and the applicability of what is learned to all other areas of life.

For example, when a student has learned how powerful it is to have a strategy for attacking a problem and being conscious of the strategy, observing when it is working and when it needs to be changed, that student is then helped to find other areas of his or her life in which the same strategy would be useful. The development of self awareness, of an appreciation of how one is using logic and thinking processes is a key element of the system.

Myron Tribus

Letter from Jerusalem #4

10 July 1997

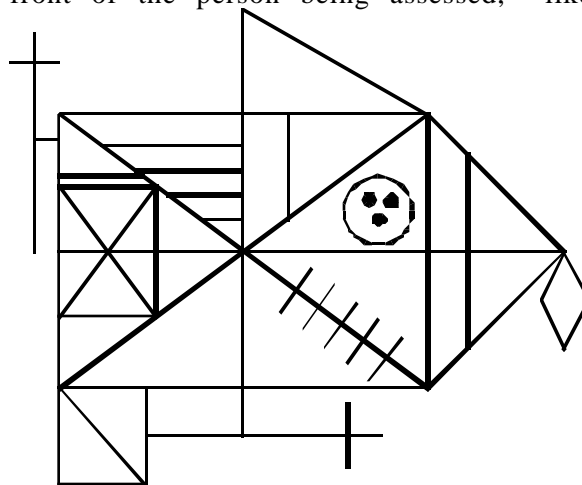
Yesterday was quite full. In the morning we continued our study of the LPAD. In the afternoon we had a tour of the old city of Jerusalem and then went to an Israeli Army base to meet the Down Syndrome men who were serving in the Army.

The visit to the army base was quite moving. First of all, the men who were victims of the Down Syndrome were not easy to spot. They were in uniform, like the rest, and they were not separated. However, a few were recognizable because of facial features. I would not have recognized most of them, however. They simply were part of the army.

A general told me that the men did their work, mostly concerned with equipment maintenance, with good quality. They were proud of their contributions to the defense of their country. I asked about acceptance among the other soldiers. He then spoke of the fact that in the army they had a clear mission, they needed one another, they were all on the same team, they valued one another for the contributions they could make. Without ever discussing Deming's ideas or quality management, he reflected them in word and action. It was most gratifying.

There was a small ceremony involving the planting of trees in a small plot of land which will be known as the 'Volunteer's Park' (I believe that is the name) in honor of these men. The army hosted a dinner for the 200+ attendees and there were some ceremonies during which the Down Syndrome men were given small medallions. This was the only time I saw them singled out from the others and as they came up for the award, saluted and shook hands with Dr. Feuerstein and the General, I saw only a few who seemed 'different'. I took a few photos of them in among the crowd of diners, laughing, joking and participating. Ironic, isn't it, that what impresses is that they are not different?

One of the techniques of the LPAD involves placing a rather complex geometric figure in front of the person being assessed, like this one.



You can see from the complexity of the figure that this is not an easy figure to assimilate in the mind. There are crosses drawn in some parts of the diagram.

A few fins are placed atop the rectangle. A rudder like appendage is at the bottom.

The assessor places this complex figure before the learner and gives him a piece of paper and a set of multicolored pencils. He writes the numbers 1,2,3,4,... at the top of the page, each in a different color. The learner then starts to copy the figure using the first color.

At different stages of the drawing, the assessor asks the learner to choose a different color pencil, according to the sequence at the top of the page. When the drawing is completed, the colors allow them to see in what order the drawing was made. The purpose of this investigation is to understand the cognitive processes used by the learner in attempting to complete the drawing.

In the last letter I made reference to the list of cognitive deficiencies compiled by Professor Feuerstein and gave a couple of examples. Here is a more complete list:

Deficiencies during input:

1. Blurred and sweeping perception.
2. Unplanned, impulsive, and unsystematic exploratory behavior.
3. Lack of, or impaired receptive verbal tools that affect discrimination, (e.g., objects, events, and relationships are not appropriately labeled).
4. Lack of, or impaired spatial orientation and lack of stable system of reference by which to establish topological and Euclidian organization of space.
5. Lack of, or impaired temporal concepts.
6. Lack of, or impaired conservation of constancy.
7. Lack of, or a deficient need for precision and accuracy in data gathering.
8. Lack of capacity for considering two or more sources of information at once. This is reflected in dealing with data in a piecemeal fashion rather than as a unit of facts that are organized.

Deficiencies during elaboration (or processing)

1. Inadequacy in the perception of the existence of a problem and its definition.
2. Inability to select relevant as opposed to irrelevant cues in defining a problem.
3. Lack of spontaneous comparative behavior or the limitation of its application by an inhibited need system.
4. Narrowness of the mental field.
5. EPISODIC GRASP OF REALITY
6. Lack of need for the establishment of relationships.
7. Lack of need for and/or exercise of summative behavior.
8. Lack of, or impaired need for pursuing logical evidence.
9. Lack of, or impaired ability to use inferential or hypothetical (if) thinking.
10. Lack of, or impaired ability to use planning behavior.
11. Non-elaboration of certain categories because the verbal concepts are

not part of the individual verbal inventory on a receptive level, or because they are not mobilized at the expressive level.

Deficiencies during output

1. Ego-centric communication modality
2. Blocking
3. Trial and error responses
4. Lack of, or impaired verbal or other tools for adequately communicating elaborated responses.
5. Lack of, or impaired need for precision and accuracy in the communication of one's responses.
6. Deficiency of visual transport.
7. Impulsive, random, unplanned behavior.

The assessor must be well trained as an observer. Using the colors of the pencils and discussion with the learner, the assessor tries to see which of these cognitive deficiencies were causing difficulty. What was the strategy of the learner? Did he draw the major figures first (the rectangle, say) or did he just start in one corner and try to work his way along one or another dimension, without seeing the whole? Did he attempt to be precise in drawing the various angles, horizontal lines, spacings, etc.? Did he recognize basic shapes such as triangles, rectangles, etc. or were they badly distorted?

These behaviors can be traced back to the list of cognitive deficiencies listed above. Failure to organize the system of lines as a coherent block of information, with a definite form, will lead to an un-systematic way of trying to keep in mind the task of drawing them.

There is a fundamental difference between the LPAD and conventional testing. We are NOT interested in how well the drawing is made! We are interested in the cognitive processes of the learner. Specifically, we are interested to make the learner AWARE of his own cognitive processes and to become involved in understanding what he is thinking as he proceeds. Most of us, when faced with a task, just start doing what seems to be the proper thing to do, giving thought to what we do only if it becomes necessary. I drive my car and respond, impulsively, to the traffic, swerving one way or the other to avoid an accident. This is a good way to survive. On the other hand, when faced with a task which is not familiar to me, and in the absence of immediate danger, it is not a very good way to behave. Yet most of us will stop to think about what we are to do only when we must. The difference between those who succeed in doing the more complex tasks of cognition and the rest of us is that those who succeed have learned to be conscious of what they are doing with their brains. They do not act impulsively when it is inappropriate to do so.

The question of just what is consciousness, how we become aware, and similar questions are not answered well. There are quite a few books and many essays on the question, but no agreed upon answers. It remains one of the mysteries of life. But we do know that in order to make good use of our ability to think, we must become conscious of what we are doing as we think. The whole thrust of the LPAD is to develop a relationship between the learner and the assessor

which enhances this awareness and guides the learner into recognizing wherein he or she is not making good use of cognition. The assessor is NOT aloof from the learner, administering an unemotional, 'objective' test, attempting to remove himself from the process so as to get a 'true' measure. There isn't any 'true' measure!!

There is an emotional content to this interaction which is very important. As the learner is helped to develop a strategy for attacking the drawing, the assessor keeps a record of what is happening (how many times the learner has to back-track, for example). This record is NOT kept secret from the learner. "See, when you adopted this new strategy you were able to make more of triangles and made fewer errors. It is working for you now, isn't it?" By giving encouraging feedback, pointing out success and the causes of success, the assessor is able to mediate feelings of accomplishment. Most psychometric activity involves making a person aware of failure or, if there is success, providing a ranking against other people taking the same test. The purpose of mediation is to help people to draw useful lessons from their own experience. This includes understanding WHY success was attained or WHY there was a failure and what to do about it. The purpose is continuous improvement, not competitive scoring.

There is another interesting analogy between what we have been doing in quality and what is done in Feuerstein's approach. At Toyota the assembly lines have a number of signal light stations. The lights are green, yellow and red, like traffic lights. When the light at a station is green, it signifies that all is going well. When it is yellow it means there is some difficulty at that station, but the line can still proceed. When a station turns red, the line must stop because something has gotten out of control. In the US a manager, seeing all green lights, would usually feel good about the situation. In Toyota, if all the lights are green, the production manager will issue an order. "Remove one of the workers." This will cause a yellow light. The people then set to work to solve the resulting problem. When they get it solved, the light goes back to green and the work proceeds with one less worker. In other words, when all is going well, they deliberately stress the system as a way to find out how to improve it.

In Feuerstein's approach, the tasks are made successively harder and harder to do. In the method called "Organization of Dots" the task is find various shapes which are hidden in what at first appears to be a random collection of dots (like finding the constellations in the stars in the night sky). As the learner succeeds in finding simple squares and triangles he is then given the task to find, say, hourglasses and ski-boots. Then he is asked to find fishes and boats. The shapes become more and more complex and as the learner gets frustrated he is helped to assess his cognitive processes. The mediator helps you to examine why it was you were able to succeed in the easier tasks and why it is you are having trouble now. You become aware of what you are doing. There is no limit to the complexity and difficulty of the tasks you can master this way.

As the tasks get tougher and tougher, you remain confused, but each time at higher level!!! Thus is true progress made.

Until you have gone through this yourself, you cannot appreciate what this awareness of cognitive processes does for you. I think this is the essential process to attain what Deming called 'metanoia'.

We are now working from 8:30Am until 10:00PM. I'm not sure this reporter can continue a daily report. Maybe I'll find some time on the weekend.

Myron Tribus



"Down Syndrome" soldier, after plastic surgery and MLE, now serving in Israeli Defense Forces!!

Letter from Jerusalem #5

11 July 1997

During this last week, a powerful analogy has been building in my mind and in this letter I wish to explore it more fully. This analogy pertains to similarities and differences in the transformation of an organization and in the transformation of an individual person. As we all know, when external circumstances change, an enterprise must also change or it will not survive. The people who work in the enterprise, at all levels, will also have to change and this presents two problems. The survival of the enterprise depends upon how the people change what they do and their own survival depends upon how the enterprise makes its change. These two transformations are intimately linked.

This morning Professor Feuerstein began his lecture saying, "The central issue in our work is the enhancement of modifiability. The concerns must be how to make a person more adaptable to the external changes AND to make him or her more adaptable to the changes within. We must all adapt to changes in self, i.e., aging, new understandings, shifting of interest. The challenge is to modify one's self, not just to adjust to changes in external stimuli. Changes in behavior are required, changes in the way of thinking, indeed, changes in life itself."

The aim of SCM is the enhancement of the propensity to change. This propensity is the hallmark of the human being. Learning to learn means learning to modify one's self.

Our concern for this change must go beyond today and that raises an important conflict. Change is necessary for our survival, yet we must not lose ourselves in the change. We should not forget our past. When the changes occur, we will ask, "Am I still me?" We need to modify ourselves but in the process we should not lose ourselves, our basic character, our identity. We each have to address the question, "What part of me is constant and unchanging and what part should be modified?"

In my work with people in industry and in education, I have seen this struggle many times. Deming discussed this under the heading of 'metanoia'. We often discuss the necessity for the top management to 'change their paradigm'. What is really desired is that they change themselves, that they modify their cognitive structures.

Humans cannot be modified; they must modify themselves. Modifiability requires consciousness, awareness of the problems of change. It requires understanding of the processes of change. What are the areas in which I must modify myself? Where have I already done so? Has it been good or bad? How did it happen? How am I to do it?

These considerations apply equally well to the enterprise. In the last letter I discussed briefly the analogy between, say, the operations at Toyota and what Dr. Feuerstein does.

If you go with me to the assembly line at Toyota, you will find that each station has a traffic light, with green, yellow and red lights. If the red light comes on, it means that the line must be stopped because something very bad has happened and the production system is out of control. When a red light comes

on, people run from everywhere to fix whatever is wrong and to get the line going again. When the light is green, the system is working as it is supposed to work. If all the lights are green the supervisor will remove a worker. This may well cause the light to turn yellow, which means there is a problem but they are dealing with it. After awhile, when they figure out how to do the work with one less worker, the light will go back to green. In other words, they deliberately create a problem and in solving it, move to a higher level of efficiency.

To develop greater efficiency in learning, Feuerstein's methods call for learners to tackle problems which begin at a low level of difficulty. The learners do not just solve these problems, they also discuss what they had to do to find a solution. As soon as they have developed a method and understand it, the problem is changed so as to introduce a new source of difficulty. In other words, the light goes from green to yellow! This process of challenging capabilities goes on forever! For example, in finding patterns in what appears to be a random field, the shapes to be found and the nature of the field are made more and more complex. At each level of difficulty the learner has to develop better methods to cope with it.

At Toyota they believe that the process of improvement has no limit. The reason it does not go on forever is that any product has a limited life. Periodically they must begin anew with a new product. Likewise, in helping people to learn how to modify themselves, there is no limit except that caused by the finiteness of life itself. You live only as long as you learn.

The following table shows the most significant cognitive capabilities required for the three phases, INPUT, ELABORATION (or processing) AND OUTPUT.

COGNITIVE FUNCTIONS

INPUT.....	ELABORATION.....	OUTPUT
(reception).....	(processing).....	(communication)
Data Gathering....	Problem Definition.....	Mature
...Systematic.....	Consideration of evidence..	Accurate
...Accurate.....	Comparison.....	Appropriate
...Clear.....	Hypothesizing.....	Participatory
.....	Summation.....	Verbally adequate
.....	Retention	
Temporal/		
Spatial		
Competencies		
Verbal adequacy		

The various tests, mediations, assessments at the Center are concerned with finding deficiencies in these functions and then to provide improvement.

The main thrust of the activity is to make the learner self aware and able to correct these deficiencies himself (or herself).

We may, it seems to me, ask the same kinds of questions of the enterprise. Does the enterprise have a good way to learn? Does the enterprise suffer from the same kinds of cognitive deficiencies as I listed in the last letter? How can we find out? How can we correct them?

Peter Senge has been very influential in helping people understand the importance of learning in organizations. It seems to me that there is much to be learned here from how to improve the learning of individual people. We need a better theory of how an enterprise learns. It is helpful, of course, to have a description of the learning process in an enterprise. A good flow chart will describe it. But we require more than a good description. We also need a good theory. Could the theory of cognitive structural modifiability, that gives such good results with individual learners be used to advantage with organizations?

At Center they have developed a 'profile of modifiability', which gives an indication of a person's readiness to be modified and charts the progress in modification. The process is complex, requires much training and so I shall not delve into it here. As I examined the process, it seemed to me to map onto the quality movement this way:

For any person or enterprise, we need to decide what area of competence needs to be changed. (see the table above)

Then we need to define the quality associated with such a change, i.e., what is excellence? What does it mean for an organization to execute one of these competencies extremely well?

Then we need to define the degree of autonomy we expect to see in the person or group in which the enhanced competence is to occur.

In the improvement of the cognitive functions of a person, it is essential that as a person solves a problem, he or she becomes aware of HOW the problem was solved. This awareness is essential to future problem solving. Just being able to solve the problem is not enough. I have seen teams assembled to solve a problem, turn in the solution and disband with no one thinking it was important to record and learn from the process used to gain a solution.

The formalization of quality improvement processes used by teams has value greater than just showing the team better ways to solve problems. I would be interested to learn of companies which have investigated how to IMPROVE the processes of quality control circles. Have there been any master's or doctoral theses on this question, i.e., how to IMPROVE the improvement processes?

During his lecture this morning, Dr. Feuerstein returned to the concepts which serve to distinguish the LPAD from conventional psychometric examinations. In conventional psychology the aim is to obtain an 'objective' measure of what the learner can do. This measure is scored in a standard way to permit comparison among groups of individuals (that bell curve). The LPAD centers attention on process, not results. As at Toyota they do not care to compare their productivity with that of GM. They just want to improve continuously. At the Center for the Enhancement of Learning Potential, they are concerned only with the continuous improvement of learners, not ranking or rating them.

Well, there are more things to be said and learned about the potential of transferring to enterprises what we have learned about the learning process in individual learners. I have another week in which to learn more.

Today Feuerstein also told us the case of a Down Syndrome man of remarkable attainments. As you probably have heard, Down Syndrome is caused by a chromosome deficiency which affects the physical structure of the body. The head and face are often misshaped, the tongue is too large, so speech is often impossible. This man has had extensive reconstructive surgery. The result is a changed mouth, chin, forehead, eyes and, of course, the tongue. Feuerstein said that when they first started to work with him he was regarded as "dull", that is, unresponsive, without initiative, no evidence of curiosity. Then after mediation he began to be creative. He took up painting. He now designs costumes for dancers. He has designed stamps. He also writes poetry. He served in the Israeli Army. He is employed, also, as a caregiver for the elderly and the handicapped. He now lives a productive, fulfilling life.

Shalom.

Myron Tribus

Letter from Jerusalem #6

It is now Saturday here in the Judean hills. It is a religious day in Israel and so it is a time for rest and reflection. If I were a religious, orthodox Jew, which I am not, I would not be sitting here at the keyboard. For me it is a time to play, to sit and think about what I have learned during the week and to consider what it might mean to the larger systems that occupy my attention most of the time. My form of religion requires me to think about what I am doing, have done and might do. I have been told that in the Scottish Church the people do not go to pray to the Lord, they go to debate with Him. I like that better.

In particular, I am pursuing a thread: What are the implications for systems level behavior that can be developed from what has been learned about how people learn? When I speak of a system I refer to a collection of people, procedures, processes, programs, and purposes, which are expected to act coherently to fulfill an aim. Business enterprises, school districts and even governmental agencies all fall within this definition.

There have been many discussions about what should be the aim of these enterprises. In a recent posting Professor Goolsby pointed out that whatever we might think OUGHT to be the aim of business enterprises, we should keep in mind that when asked "What is the aim of a business?" recent graduates of business schools will reply "To Maximize Shareholder Wealth." As Goolsby pointed out, this is a meaningless statement unless it is elaborated further. It can be a rallying cry for investors but until certain questions are answered, it is a meaningless response. The questions which ought to be asked are: "Over what time period?" and "Do you believe that business actions are deterministic or do they involve probabilistic elements, in which case do you mean 'maximize the EXPECTATION of wealth'?" "What do you think shareholders want?" "How do they regard risk and stability versus quick profit?" Finally, the question is, "By what means?"

I shall not pursue this much further. The question deserves much more thought and effort than I wish to give it now. I am at this moment on a different thread.

When we consider the aim of education there are similar problems, which have been analyzed very nicely by Professor Feuerstein and Mildred Hoffman. (I'll supply the precise reference another time. Today reference materials are not available. It is a day of rest!) They raise this question: "What is the role of education in an era of very rapid change? Should the adult generation fasten onto the children the perspectives and capabilities that were so useful in a bygone era and which are inadequate to the future? Our children are going to live in a world which is vastly different from the one in which we grew up. Should we fasten onto their backs the inadequacies we now feel with regard to the ever changing present?"

There are some who believe we can solve this problem by giving them the tried and true values of religion and leaving to them the task of developing the tools and techniques. This approach does not take into account the very nature of difficult ethical and moral issues created by new knowledge and new technologies, such as cloning, DNA, birth control, population pressure, social instability, etc., etc., etc.

Feuerstein's response is that we must equip our children with the cognitive structures and capability to modify these structures that have been developed by the human race. In other words, we do know how to give them the answers to the questions which are yet to be posed. But we do know how to give them the cognitive competencies, the 'thinking skills', if you will, that give them the best chance to find the answers they will need for survival.

At the International Center for the Enhancement of Learning Potential (ICELP) they have concentrated for half a century on the task of identifying these basic cognitive competencies, on the task of how to assess their presence, absence and propensity to change in different individual learners, on the task of mediating the experiences of learners so that these propensities will be realized. They have constructed a coherent theory of the process and created tools and techniques for carrying them out as well as an infrastructure for the training of teachers, training of trainers, the publication of supporting materials and the carrying on of research to improve our knowledge and know-how in this subject.

The results of their efforts presents us with a paradigm shift in the field of education which parallels the paradigm shift represented by the quality movement in management. Not only are there changes in the belief system required for the successful prosecution of quality principles, but also there are changes in the tools and techniques, the roles and responsibilities of the players and the reward structure, there is also a change in the lives of the people. When the quality principles are pursued as a 'way of life', the consequences spill over into those aspects of life outside the enterprise, i.e., the family and social interactions in general.

I recall a visit to Venezuela, about 12 years ago, where I met an 'elite technician', that is a high level technician, working in the oil fields. He was a member of an improvement team that connected pipelines to the well head. He told me that he was so impressed with the study materials from the Juran institute that he took the videos and books home and studied from them with his wife and teen age son. He told me with great enthusiasm how it had changed his relation to his wife and son. Indeed, he was so affected that he called his newborn son, "Juran"! Later, at an ASQC meeting in Detroit this we were able to bring the man, the infant and the wife to the conference, tell the story before 2000 people and then introduce them to Juran as a surprise! There wasn't a dry eye in the house! Yes, the paradigm shift in quality spills over into other areas of life.

So it is with this paradigm shift. As we change the way we think, we also change the way we behave.

During last week I have had to sharpen my understanding of what I mean by the word "think". Take, for example, rote learning. I learned the multiplication tables up to 12 times 12. As a result, given any two numbers I could, by simple recall, without thinking, tell you their product. This is a very efficient and useful competence, but it is not an example of thinking. In the local jargon, it is called 'perceptual' response rather than a 'cognitive' response. We do not have to stop and think; we just know the answer from the stimuli presented to us. The advantage of rote learning is that we do not have to stop and think; it saves time and effort. The disadvantage is that if something changes or we do not exercise this competence for some time, we

lose it. If we never had a hand in constructing it from a more primitive or fundamental base, we cannot reconstruct it.

This difficulty is confronted in the teaching of mathematics in the lower grades by a method called "Cognet", which is now being used in a number of schools. In this system, the children are presented with a problem in, say, long division and asked "How many different ways can you invent to solve this problem?" When I saw a demonstration, carried on by children who were about eight years of age, I was surprised at the number of different ways they demonstrated. Not all were efficient, but they were creative. This was the opposite of the formal algorithm I was taught. I had to do it the way the teacher said or it was wrong. But the way my computer does division is quite different!

There is an analog to all of this in industry which I have found quite by accident. When I am not loafing like this, I work at a company I helped to found, Exergy, Inc. We are introducing a new kind of power plant for use by electric utilities. In this endeavor, we have had to work with a number of companies which are engaged in the construction of power plants. A power plant is a very expensive beast. It can cost as much as a half a billion dollars. It is hard to build one for less than \$75 million. It is also a very competitive business in which every cost is scrutinized very carefully. The field, until we came along, has become very stable, with modest improvements coming along year to year. To cut the cost of engineering, much of the engineering design work has been reduced to the filling out of spread sheets, containing the various requirements of a particular installation. This spread sheet represents to the enterprise what rote memorization represents to the learner. It is very efficient and saves the engineer from having to think anew about each and every problem. One of the oldest companies in the business has published a book of information on how to design a power plant. It shows in detail how to fill out the spread sheets.

This reliance on a rote memorization (no matter how complex, it is still rote) gave them a competitive advantage. That is, it did until our new technology came along. To use our superior technology it is impossible just fill in the spread sheets. The engineers have to go back to the fundamentals and think anew. Now while each engineer may be capable of doing this (though some of them are not) it is evident to me, in working with these companies, that as an enterprise they are incapable of thinking outside of the standard practices they have developed. They are over 100 years old and they now experience hardening of the standards. Spreadsheets are the plaque on the walls of their processes! (I use that analogy because I had to have open heart surgery to counter the effects of plaque on my arteries. The analogy is apt, believe me. I know.)

Now, what lessons are we to draw from all this? Well, first consider what is done by Dr. Feuerstein to enhance the cognitive capabilities (structures if you will) of learners? He has them work various kinds of problems in which they develop strategies for problem solving and refine these strategies until they get pretty good at them. As soon as they have developed a routine and have reduced the amount of cognition required, he gives them a harder problem, one for which the previous strategy will no longer work, or is so inefficient that it is unpleasant. Thus they are forced back into thinking in a more fundamental way, that is, to develop more fully their 'propensity to change',

to be more open to learning. This oscillation between a standard fixed way of solving a problem and the development of a new, better way to deal with more complex issues is the essence of human growth and development.

About 15 years ago, during a visit to Yokagawa Hewlett-Packard, the CEO, Mr. Ken Sasaoka, illustrated for me how the same concept works in quality management. At the time I did not see the connection nor did I appreciate how profound it was. He said to me, pointing to a standardized procedure for an assembly operation, posted on the wall. "I look at the date of the last update of this procedure. If it is more than six months, I ask what is wrong."

The setting of a standard procedure provides for the enterprise what rote memorization provides for a learner. It increases the efficiency of a given operation. To remain flexible and open to change, however, the wise manager insists upon constant improvement in this procedure. Not only are there benefits from the improvement, the enterprise itself becomes more open to change.

It is not an accident that the company that has profited so much in the past from its spread sheets has been unable to work with us and is now to be replaced by a Japanese company in which the names of Deming and Juran are well known.

Tomorrow there will be no letter. I am going to be a tourist in Jerusalem.

On Monday we are to have our first experience with a child, using the LPAD method of assessment. All of my life I have worked mostly with university level students. These children are all selected because they have learning disabilities, often quite severe. I expect them to teach me much.

Myron Tribus



"S", throwing back her head so she can think! Then she straightened up and went back to work. What do teachers think about such behaviour?

Letter From Jerusalem #7 15 July 1997

This is a difficult letter to write, for my experiences in the last two days have been most extraordinary. I suppose that teachers who work with children who have special needs see all the time what I have seen only in the last two days. The experience has given me a different perspective on our educational system and the need to change it, soon.

As part of our training and studies in the field of structural cognitive modification, we are learning to use the Learning Propensity Assessment Device (LPAD). This device, as I wrote in a previous letter, is used to make a DYNAMIC assessment of the propensity for learning. It goes beyond the original concept of Vygotsky, who took the view that testing of learners should not focus on the past accomplishments or failure to accomplish but instead should concentrate on what he called the 'next zone of proximal development'. He put it this way: "The only legitimate purpose of an examination is for the teacher and learner to decide what to do next." The LPAD has been designed to find how to improve the learning process, not to rate the learner on current or past accomplishments.

This distinction is critical. As things now stand, the purpose of testing children is to see how well equipped they are to deal with the educational system. Testing is used to predict how well a child will do when thrown into the system. The child must adapt to the system. Despite the claims of most school systems, "We develop each child to its fullest potential", the name of the game continues to be, "Sort them." The Feuerstein approach, based on Mediated Learning Experience (MLE), is the opposite. The system adapts to the child, always looking for continuous improvement in the learning process of the child. That's the key: Improve the learning process of the child, continuously.

This idea, by the way, corresponds to the quality philosophy which tells us that you cannot inspect quality into a product. In quality management we have learned that end of the line inspection is bound to be wasteful. Continuous improvement of the PROCESS will always produce a better product at least cost and least waste. When done properly, there is no need to inspect at the end of the line.

When the quality movement hit America in a big way in the early 1980's, the wisdom then was that the pursuit of quality would increase costs. It was not until the Japanese, using the quality concepts they had learned from the Americans, Sarasohn, Deming and Juran, began to demonstrate that the cars they produced cost LESS and were HIGHER QUALITY that this belief began to crumble. Despite the passage of nearly two decades, this belief that higher quality always costs more still persists in many board rooms.

So it is in education. There is a persistent belief that higher educational attainment by the students, that is higher quality of the learning process, will cost more and, therefore, cannot be afforded. Just as in 1980 the auto makers hadn't a clue concerning how to increase quality, except by inspecting more carefully, so it is that in education, the leaders of most of the systems, around the World, do not know what to do to increase the quality of learning, except by calling for more frequent and thorough inspections.

Just as there was no accepted theory of quality current in the USA (and in Western Europe, as well) in industry in 1980, so today, there is no accepted theory of learning for the continuous improvement of education. Our leaders continue to call for more extensive testing. In the UK the testing is to be done nationwide, at many levels. The only reason something similar does not occur in the USA is that the Department of Education is weak and the system is divided into the fifty states. Sometimes we are just lucky. More testing to demonstrate what has or has not been accomplished by the students is not the answer.

The LPAD differs from conventional psychometric testing in that it attempts to measure and identify those areas in which the learner is prepared to learn. To learn how to use the LPAD we were presented with children who had been selected by the educational system as having difficulties. The system did not send the children to us. Rather concerned parents have brought their children to the center because they were upset with the educational system. When I refer to the educational system I am not referring to any one country. The children we see are from all over the world. Furthermore, here at the conference, where I am meeting people from about 33 countries, the story is always the same. The educational systems of the World now seem to share the same characteristics. Psychologists have infected all of them!

Three of us worked with one student. The other two were a teacher from New Zealand and a teacher from Israel. The little girl with whom we worked shall be referred to as "S". S was 11 years old. As a small child she had had a small ear infection which, for awhile, had affected her hearing. She has been having trouble with reading and was doing poorly in school. When examined by a psychologist in the Israeli education system she had been classified as having a low IQ (83) and described as requiring special education. Her mother objected strenuously. I had lunch with the mother and learned that she had caused quite a ruckus with the system, demanding to see the files which had been written on her child, S, as well as herself. The mother was outraged to find that the psychologist had also written that she was a very demanding mother, who was 'aggressive'. I watched the mother with her three children and was impressed with how easily she dealt with the children.

The tests we gave to S were of several types. One, called "Organization of Dots" requires the child to find figures hidden in clouds of dots, somewhat in the way we recognize constellations in the stars. The purpose of the examination is to discern HOW the child goes about the task of finding the figure. We are not interested particularly in how many she can find or how easily she finds them but rather in understanding two things: 1) How does she do it? and 2) How amenable is she to learning improved ways to do it?

When we began we found that S was very good at finding the figures. Indeed, she was faster than some of us! However, it soon became apparent that her method was essentially just a random search. Her ability to see the whole system was very good and she worked at what we call the 'perceptual level'. At this level no thought processes are needed. The person just sees the answer and if asked how he or she did it will just look blankly and say, "I just saw it, that's all." This sort of functioning, which does not involve any thinking, is very efficient for simple problems but when the complexity of the problem increases beyond a certain degree, it breaks down. Thus, a student who has not learned to think about what he or she is doing, will be handicapped in

moving up through the school system. It is important to recognize this cognitive deficiency early and do something about it.

According to the Feuerstein theory, this way of approaching a problem is not a 'trait' of the learner, that is, it is not a fixed characteristic, but rather represents a 'state' of the learner. It is an indication of the process used by the learner and can be modified. What needs to be done is to modify the way of thinking.

We gradually increased the difficulty of the problem (more dots, more figures, more overlapping, more placement of dots so that it was possible to get wrong answers and not know it until near the end of the search, etc., etc.) Soon S was having a little more difficulty. At that point, the LPAD differs from psychometry, for the assessor stops assessing what the student can do, but instead offers mediation. I took that role and started by questioning her practice of looking first for the triangle and then for the two squares. Her first response was to resist the suggestion and continue to try her own way, looking everywhere for three dots to form the requisite right triangle. But I persisted and soon she started to try my suggestion: "Look first at the dot that is farthest out from the cloud. Then see if you can form a square from it. By the way, how do you recognize a square?" This led us to a discussion of what constitutes a square.

If S is to think about finding a square, and not just look randomly for it, she will have to have firmly in mind what the characteristics of a square are. Then she has to have the ability to hold these characteristics in mind no matter how the square might be rotated in two dimensional space. Finally, she has to have a name for the square and its parts, (corner, side, angle) so she can communicate with herself during the search process. If she is to take charge of her thinking, she has to be able to engage in metacognition, that is, thinking about thinking. She has to be able to think about what she is doing as she searches for the figure in the dots.

This is where the Feuerstein approach differs from what is traditionally done. Teachers try to use extensive motivation to get the child to "Try harder. Just think!" In the Feuerstein approach the child, even at age 11, is found to be capable to think about thinking and to become aware of what is going on in the cognitive processes.

We made use of list of cognitive deficiencies that Dr. Feuerstein has prepared and according to this list could recognize that she has several deficiencies, such as unplanned behaviour during input of information, inadequate verbal skills and impulsivity. The questions for us was this: How ready is this child to accept mediation which is directly aimed at correcting these cognitive deficiencies? We found, through patient interaction with the child that after she had had a chance to try out our suggestions and found that they did improve her performance, she began to adopt them. But would the modified behaviour persist if we gave a different class of problems, made the problems tougher and didn't intervene? To make a long story short, the answer was "Yes". This child, who had been portrayed to us as 'difficult' was not only willing to take the mediation and profit from it, she enjoyed it! Although it had been said that she did not pay attention to her work, she worked with us for about four hours, with very little time out and was full of energy all the time.

Over a period of about six hours working with the child we concluded that she was very bright, creative, curious and persistent. We concluded that she had a very poor use of her vocabulary. Part of the problem was that her first language is Hebrew and English is a second language. However, even in Hebrew (according to the Hebrew speaking member of our team) she did not want to use the higher levels of language. Thus we mediated with her to get her to say "Number" instead of "three" or "six". ("Why is this figure incorrect?" "Because it has three stars and it should have four." "Yes, that is correct. It has the wrong number of stars, doesn't it?" "Yes, it has three instead of four." "No, I want you to say it has the wrong number, not 'three' or 'four'") She resisted this mediation at first but as we went to more complicated problems she began to realize the economy that comes from working at a higher level of classification. When we extended this principle to the classifications of 'shapes', 'colors', 'length', 'size' she began to use these words, first only with prompting, then later on her own..

Now why did we pick out this aspect of language? Because, if you do not have an adequate vocabulary, you cannot become conscious of how you are thinking and become deliberate in your thinking processes. It is pretty much a matter of talking to yourself and having the right words with which to do it.

We administered a number of other tests, each time alternating between mediating and testing. You see, we were not interested in scoring her performance or ranking or rating her competence. We are interested in seeing how she learns, what deficiencies might be present and most of all, her readiness to learn in the areas where we see the greatest difficulties for her.

Being able to test and document the propensity for learning in a child who had, for all intents and purposes been written off by the system was a new experience for me. But as I talked with the staff of the center and with the other people from all over the World, I began to understand just how big this problem is.

This evening I shared my concerns with Dr. Feuerstein. "It is a dreadful problem", he said. "We see children from all over the World who have been brought to us. It is not only the down syndrome children, or the one's who have been damaged by poverty, child abuse, brain injuries or by being immigrants in a society where they are victims of prejudice. It is also children who have been misdiagnosed. We have rescued a man who was institutionalized for over fourteen years. We have taken children who were classified as learning disabled and helped them to succeed and, in many instance, move to the top of their class."

"But it is not just these cases that come to us. The existing educational system just is not equipped to improve the cognitive structures of the children."

I think I shall close this series of letters. We are now coming into the phases of our studies that require a great deal of work and introduce very little new theory.

I see clearly, as never before, what needs to be done in education and, at the same time, understand very well the barriers to the transformation. There is work enough for all of us.

Myron Tribus