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COMPOSING AS BECOMING:
FROM PROCESS TO HOLOMOVEMENT

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By
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* * * * *

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1984

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A Fairy Tale into a Fourier Transform

Once, when time equalled time in the Land of Awe, there were rulers known as physicists, chemists, biologists, or more generally, "our contemporary pawnbrokers of reality, [the] scientists." To gain admission into the Land of Awe, a would-be pawnbroker would be forced into tournaments of skill involving the fragmentation of the Land into myriad parts, this skill hinging upon the concepts of "machine, mechanical, engineer;" and those concepts "do not refer to rational knowledge but to cunning and expediency." Moreover, the scientists are endowed with "one of the most highly developed skills in contemporary Western civilization [which] is dissection: the split-up of problems into their smallest possible components." After demonstrating fragmentation skills, the physicists, chemists, and biologists would then be required to take the solemn Oath of Aw(e)ful Reality, translated from the mathematic equations as "I am the observer, and what I see is the observed. The observer and the observed are two separate entities, with the observed being that which is analyzable." When a pawnbroker takes the Oath, he becomes fixed in a reversible world; it is a world that is in equilibrium, one that is linear and enveloped in a closed system. Finally, the passage into a reversible world allocates to the scientist a fringe benefit: he receives a magical hat which is placed upon his
head. The magical hat permits him to distinguish between mind and brain, for he becomes a veritable doppelganger of himself. If consciousness becomes a bother, then the magical hat switches to matter, or if matter becomes a matter of concern, then it is hats off to consciousness. These, then, are the serendipities in the Lan of Awe.

As it happens, there is infinitesimal perturbation in Awe, hence the present rulers advertise the Reduction Olympics which includes the fragmentation skills, observation techniques, reversibility routines, and mind-brain relays. A morphological example of the fragmentation contest is the transplating of organs or parts in the human organism. Inasmuch as the universe is made up of parts, as many pawnbrokers of reality bid us, the parts are definitely interchangeable; so, too, the human organism. The body human may be one organic whole, but in the Lan of Awe, there are specialists who deal with specific organs and particular disorders with an electronic way to a human's heart.

... the medical profession is divided into specialities, each treating a different part or system of the body. The heart is, on one hand, inextricable from the whole, but on the other hand we can replace this part with another through transplantation ... while things may be tightly interconnected--like the heart is with the bloodstream, liver, bone marrow, and muscles--they are nonetheless fundamentally separate and analyzable.5

Next, the observation techniques. Before a scientist is privileged to take the Oath of the observer, she must perform the cat's meow which is Schrödinger's cat-in-the-box experiment.6 The scientist must correctly deduce whether the cat is alive or dead at the end of this
Schrodinger suggested that we imagine that a cat is sealed in a box along with a weak radioactive source and a detector of radioactive particles. The detector is turned on only once for one minute; let us suppose that the probability that the radioactive source will emit a detectable particle during this minute is one out of two $= \frac{1}{2}$. Quantum theory does not predict the detection of this radioactive event; it only gives the probability as $\frac{1}{2}$. If a particle is detected, a poison gas is released in the box and kills the cat. The well-sealed box is far away on an earth satellite, so we don't know if the cat is alive or dead.

According to the Copenhagen interpretation, when the box is opened the scientist will have the facts, i.e., "uncertainty into knowledge." Further, anything in the world exists only if we observe it directly. If this is so, then the cat-in-the-box is neither alive nor dead until it is observed. The scientist, after commuting to the earth satellite, is beguiled into opening the box. She has been lured into the belief that there is a $\frac{1}{2}$ or 50% probability that the cat is alive. The box is pried open, and she hears the cat's meow; she reports that the cat is alive. She sends a message to a ruler on earth that the cat is alive, and this message is passed on to all the other rulers or stored on a floppy disk in the computers. The solemn Oath of Aw(e)ful Reality can be administered since the new scientist observed the reality of the cat-in-the-box as being alive or dead.

Weird as it seems, this is the standard Copenhagen interpretation of reality. We see that it requires a definite line between the observed and the observer, a split between object and mind. At first this line was between the cat-in-the-box and the scientists.
After they opened the box the line moved to between the scientists and the computer, and so on. As information about the state of the cat propagated from place to place, so did the objective reality of the live cat. The Copenhagen interpretation demands that a distinction be made between the observer and observed; it does not say where the line between them is drawn, only that it must be drawn.9

Now, on to the reversibility routines. Quite simply, time may move forward or backward, and breathtaking equations based upon physical laws will prove reversibility. After all, experiments of any denomination are ahistorical since any well-equipped pawnbroker of reality can execute the same experiment twice without any time elapsing between experiments. The "Markov process" and Poincaré's mathematics10 state it succinctly: fundamental features of probability functions are "independent of the previous history of the system." Here is another credo:

There is no other way to solve the problem of time than the way through physics... If time is objective the physicist must have discovered the fact. If there is Becoming, the physicist must know it; but if time is merely subjective and Being is timeless, the physicist must have been able to ignore time in his construction of reality and describe the world without the help of time... It is a hopeless enterprise to search for the nature of time without studying physics. If there is a solution to the philosophical problem of time, it is written down in the equations of mathematical physics.11

Poincaré has also stipulated that systems will return to their original states. If a scientist set up two containers in his laboratory, one filled with gas particles and the other empty, with a pipe connecting each container, and a valve controlling the pipe, then he may check the verisimilitude of reversibility. (See Figure 1.)
Figure 1. Reversibility.
When the valve is opened the gas particles in Container O will surge into Container D until maximum entropy is achieved, or an equilibrium situation is reached. (See Figure 2.) Poincaré's deposition, from classical physics laws, is that the particles in Container D will eventually trek back into Container O, into the original state. Since it is likely that this can happen, according to classical physics, then the scientist may conclude that time is reversible.

The microscopic description of a physical system in terms of motion of individual particles is given by Newton's laws of motion... These laws of motion make no distinction between past and future; from the standpoint of the microscopic world, time can literally have either direction. Irreversible time, aging,...[is an] illusion from the standpoint of microphysics... The microscopic laws are therefore said to be time reversal invariant...12

Thus, what a time the pawnbrokers of reality have in the time reversal invariant Land of Awe.

Alas, the mind-brain relays for the scientist as the test supreme, the wearing of the magical hat. The test culminates in understanding that the mind can be explained by the structure of biochemical reactions in the brain. (A Neanderthal brain in a Cro-Magnon mind.) Paul Pietsch accomplished extensive research on Pseudotriton ruber, the salamander. These small, lizard-like amphibians are so resilient that they are used as donors and hosts for transplantation experiments. Pietsch was interested in the regeneration of tissues and organs, and his research seduced him into believing that the cells involved in regeneration act independently for the new tissues. In this way each regeneration could be viewed as "independent mathematical sets." It
Figure 2. Maximum Entropy.
seemed highly likely to this entrenched pawnbroker that this approach could be extended from regeneration to "memory in the brain." There were those nonbelievers who remarked that memory cannot be explained by brain equations, brain chemistry, brain structure, but Pietsch retorted:

"What kind of a nitwit would seriously believe a thing like that?" I asked a senior colleague. Don't we use legs to stand on, teeth to chew with, bronchioles to breathe through? Sperms swim with their tails. Hairs curl or don't curl depending on the detailed structure of their proteins. Even genes work because of molecular anatomy. Why should the storing of mind be different?"13

Of course, the pawnbrokers of reality have a few equations to bamboozle the unwary... But wait! In the Land of Awe, Pietsch has been kicked out and denuded of his ruler's rank. What happened? As he tells it:

Hologramic theory not only stirred my prejudice, it also seemed highly vulnerable to the very experiments I was planning: shuffling neuroanatomy, reorganizing the brain, scrambling the sets and subsets that I theorized were the carriers of neural programs. I fully expected to retire hologramic theory to the boneyard of meaningless ideas. I'd begun licking my canine teeth like a mink who has cornered a chicken. I even began considering which scientific meetings would be best for the announcement of my theory. I should have awaited Nature's answers. For hologramic theory was to survive every trial, and my own theory went down to utter defeat.14

Pietsch cleverly shuffled the brains of salamanders, mixed portions of the brain and redistributed these portions, exchanged the hemispheres, rerouted parts to other areas, and performed complete brain transplants.
The salamander does little more than chow down tubiflex worms, but the brain shuffling would supposedly cause any salamander to exhibit bizarre table manners. However, they went about their business of eating worms in perfectly acceptable salamander behavior. Based on these experiments, Pietsch glimpsed the radical novelty of hologramic theory, that there is a "distributed brain" and that memory is distributed holographically.

What principles do account for the survival of feeding after shufflebrain? How can we explain the retention of the salamander's mental codes despite its scrambled neuroanatomy? There are two major explanations. The most obvious one is that various pieces of brain must have housed whole codes. Let's call this the wholeness principle. The second explanation, a much less obvious one, is that each piece of brain must have made its own independent contribution to the animal's behavior. We'll call this the independence principle. If codes had been partially represented in a piece of brain, or if pieces mutually depended on each other to construct meaningful sequences, I would never have swapped, flipped, rotated, deleted, reversed, or added parts of the brain - all parts! - without jumbling feeding behavior.¹⁵

And, there are a few more who were previously discharged from Awe. There's David Bohm, Ilya Prigogine, Karl Pribram, along with others who cavalierly left such as, Erich Jantsch, Rupert Sheldrake, Fritjof Capra. As a matter of nonlinear function, they decided to play a tournament outside the reduction arena, and, in doing so, they interpenetrated another reality, but that reality intrapenetrated the other one. Prigogine speaks for all of them:

In hundreds of different ways scientists have expressed their amazement when, on determining the right question, they discover that they can see how the puzzle fits together. In this
sense, science is like a two-partner game in which we have to guess the behavior of a reality unrelated to our beliefs, our ambitions, or our hopes. Nature cannot be forced to say anything we want it to. Scientific investigation is not a monologue. It is precisely the risk involved that makes this game exciting.16 (Emphasis mine.)

Add to this group of high-risk takers are some who are rising out of the fossiliferous domains of social science. One such is Julienne Ford who is attacking the relics of sociological methodology.

As science enables us to devise more and more sophisticated apparatus with which to grope for the 'truth,' it seems only to drive us further away from the homely comfort of knowing-that-we-know-what-we-know.17

After all, if you were to put a jelly pie in a shockproof glass case then it might well survive a while. (It might even do a useful job in disabusing onlookers of some of their comfortable taken-for-granted assumptions: 'What? Jelly pie! Pull the other one, it's got bells on,') But an adequate methodology should not resemble a preposterous proposal for the preservation of precarious pastries. It should aim at the maximization of risks, not their virtual abolition.18

In siding with this expropriated group, I am a gadfly with a hunch, willing to take a risk. The rumbling begins, continues, ends, and begins with the fracas of writing activity. As a composition gadfly I challenge the existing, perverse, subtly deluding "writing process" paradigm. My rebel hunch, in notoriously criticizing the existing institution in Awe, is that writing is not a process but an activity of "irreversible" "dissipative structures" (Prigogine and Stengers) which "self organize" (Jantsch) into "nonlocal planes" (Bolotta) in "relatively autonomous subtotalities" (Bohm). My nonlocal planes, engulfing social
interactions under far-from-equilibrium conditions, is an analogical extension through the "implicate order" (Bohm). This extension is not intended as an explanation of writing but as a prospect for discerning language activity in a far-from-equilibrium system.

To disentangle the morass of this risk, it is necessary to speculate about how differently all those concepts are the same, how to collapse the concepts that are differentiated, how the concepts all happen simultaneously; how, indeed, does the hunch describe a reality which interpenetrates the intrapenetrated reality it seeks to describe? In a sentence:

The explainer is the explained at the moment she is explaining. The crux is the phrase, at the moment. If the moment is localized, i.e., made sequential to the other facets of that concept, then "process" is described.

Process:
1) the explainer
2) the explained
3) space/time dimension

Yet, if the moment of writing is nonlocalized into a whole activity, then sequentiality is exchanged with simultaneity. "...wholeness in this case amounts to asserting that there is no here and there or that here is identical to there." In this way a reality may be described in which the explainer is the explained at the moment she is explaining, as well as the explained is in the explainer at the moment she is explaining, whereby at the moment she is explaining, the explainer is the explained.
Figure 3. The Explainer.
Figure 4. The Explained Which Is the Explainer.
To illustrate, the explainer is bound with diverse social interactions. (See Figure 3.) The explained is the explainer, the causes and effects of diverse social interactions. (See Figure 4.) At the moment she is explaining could be illustrated as dissipative structures in which "New dynamic states of matter may originate, states that reflect the interaction of a given system with its surroundings. We have called these new structures dissipative structures to emphasize the constructive role of dissipative processes in their formation." \(^{20}\)

The dissipative structures impinge upon, through, within, from without the explained and the explainer. A dynamic state of interaction is diagrammed in Figure 5. These dynamic dissipative structures have self-organizing ability. A self-organizing state or autopoiesis is "established" after it has fluctuated through the turmoil of a far-from-equilibrium environment.

Dissipative structures: autopoiesis is the basic conditions for the dynamic existence of nonequilibrium structures. These basic conditions - partial openness toward the environment, a macroscopic system state far from equilibrium, and autocatalytic self-reinforcement of certain steps in the process chain - reappear also at other levels of self-organizing systems. Equilibrium is the equivalent of stagnation and death. A high degree of nonequilibrium which maintains the self-organizing processes is in turn maintained by continuous exchange of matter and energy with the environment, in other words by metabolism. The dynamics of such a globally stable, but never resting structure has been called autopoiesis (self-production or self-renewal). An autopoietic system is in the first line not concerned with the production of any output, but with its own self-renewal in the same process structure. Autopoiesis is an expression of the fundamental complementarity of structure and function, that flexibility and plasticity due to dynamic relations, through which self-organization becomes possible. \(^{21}\)
Figure 5. Dynamic State of Interaction.
Furthermore, "Jantsch says self-organizing, autopoietic, structures keep the shape of their processes by constantly balancing the need to remain safe from fluctuation with the need to remain open to it."22

The emerging illustration portrays a self-organizing, autopoietic structure. (See Figure 6.)

The remarkable feature is that when we move away from equilibrium to far-from-equilibrium conditions, we move away from the repetitive and the universal to the specific and the unique. Indeed, the laws of equilibrium are universal. Matter near equilibrium behaves in a 'repetitive' way. On the other hand, far from equilibrium there appears a variety of mechanisms corresponding to the possibility of occurrence of various types of dissipative structures. For example, far from equilibrium we may witness the appearance of chemical clocks, chemical reactions which behave in a coherent, rhythmical fashion. We may also have processes of self-organization leading to nonhomogeneous structures. . .23

The self-organizing identity of Figures 3, 4, 5, and 6 is emerging simultaneously in nonlocalized planes. Each Figure was, in fact, localized such that they became "relatively autonomous subtotalities" of the whole. Each Figure was "approximately separable, stable, and recurrent, but externally related" (Bohm). If these localized figures are simultaneously nonlocalized, the illustration takes the appearance of the following planes. Notice that the planes can be interchanged. (See Figures 7, 8, and 9.) Notice, also, in this enchantment of figures

- that the concepts are differently all the same,
- that collapsing the concepts through nonlocal planes differentiates them,
Figure 6. A Self-Organizing, Autopoietic Structure.
Figure 7.
The Explainer is
Figure 8.
the Explained
Figure 9.
at the Moment of Explaining
Figure 6. A Self-Organizing, Autopoietic Structure.
Figure 7.
The Explainer is
Figure 6. A Self-Organizing, Autopoietic Structure.

Figure 8.
the Explained
Figure 6. A Self-Organizing, Autopoietic Structure.
Figure 9.
at the Moment of Explaining
that the concepts, although local, all happen simultaneously,

that the reality represented by dotted lines interpenetrates the reality represented by solid lines, while at the same time in the simultaneity of interconnectedness, the dotted lines intrapenetrate the solid lines.

The explainer is the explained at the moment he is explaining.

If the hunch is to be valid at all, it must supersede the "writing process" paradigm, no matter how much that paradigm is currently cherished by those social science pawnbrokers who exclaim that the "writing process" is better than the annihilated "writing product."

Be that as it may, we must take the risk and debunk the charlatan writing process. An example of this process comes from a book with the same title:

This book is deliberately not a programmed text, but there have been efforts to bring in programming concepts - especially the systematic step-by-step articulation of objectives and emphasis on multiple interactions between student and teacher or text.24

Main Stages—Prewriting—Writing—Rewriting & Editing—Finished Product 25

Writing is linear — it goes step-by-step through a series of mental and mechanical decisions and behaviors. The communicator, by his inputs, directly determines his output (end written product).26

My previous illustration of nonlocal planes was no caprice but an attempt at nonlinearity. Reality is nonlinear and tends to seethe with disorder and fluctuation. Toffler's titilative summation of the disorderly conduct of reality is found in Prigogine and Stengers' Order Out of Chaos.
Thus, in broad stroke terms, Prigogine and Stengers argue that traditional science in the Age of the Machine tended to emphasize stability, order, uniformity, and equilibrium. It concerned itself mostly with closed systems and linear relationships in which small inputs uniformly yield small results.

With the transition from an industrial society based on heavy inputs of energy, capital, and labor to a high-technology society in which information and innovation are the critical resources, it is not surprising that new scientific world models should appear.

What makes the Prigoginian paradigm especially interesting is that it shifts attention to those aspects of reality that characterize today's accelerated social change: disorder, instability, diversity, disequilibrium, nonlinear relationships (in which small inputs can trigger massive consequences), and temporality - a heightened sensitivity to the flows of time.

The "writing process" is a linear relationship which has yielded small results, or merely the "series of products" reminiscent of the Machine Age, while the reality of nonlocal planes which are disorderly, nonlinear, and temporal - at this moment, which passes and then has a history - suggests that the risk for a new paradigm is not only provocative but necessary.

Summed up and simplified, they [Prigogine and Stengers] hold that while some parts of the universe may operate like machines, these are closed systems, and closed systems, at best, form only a small part of the physical universe. Most phenomena of interest to us are, in fact, open systems, exchanging energy or matter (and, one might add, information) with their environment. Surely biological and social systems are open, which means that the attempt to understand them in mechanistic terms is doomed to failure.
The anomaly of sashaying step-by-step through the "writing process" leads to a situation in which we are on the threshold of stability. This stability allows and promotes the status quo. If this stability is rejected, a "bifurcation point" (Prigogine) may be reached. When a state of equilibrium or near equilibrium is reached, a system, in approaching stability, begins to fluctuate and to move away from equilibrium. Bifurcation happens when the system is able to "choose" more than one possible path which permits a new shot at stability.

Figure 10 is an example of a symmetrical bifurcation diagram with X as a function of time; there are two stable states and one unstable state. As Prigogine remarks about bifurcation points, "The state we reach depends on the previous history of the system."29

Bifurcation points could pose as crisis points in that a crisis provokes an explanation of anomalies found in the previous history of a system. Thomas Kuhn would term this sort of crisis "a necessary precondition for the emergence of novel theories,"30 the groundwork for the bogeyman of scientific enterprise—a paradigm shift.

Though history is unlikely to record their names, some men have undoubtedly been driven to desert science because of their inability to tolerate crisis. Like artists, creative scientists must occasionally be able to live in a world out of joint—elsewhere I have described that necessity as 'the essential tension' in scientific research...31

If a few scientists leave the Land of Awe and traipse into "a world out of joint," they are maneuvering toward a paradigm shift. Risky business, indeed. As Briggs and Peat concur:
Figure 10. Example of a Symmetrical Bifurcation.
In most cases, scientists would prefer to adjust a theory and thereby maintain its overall structure rather than simply abandon it because it doesn't fit certain facts. Often they would prefer to think that the failure of an experiment is their own failure to fit the paradigm properly. Why? It would seem that for a scientist (and perhaps for the rest of us) there is one thing even worse than personal failure: finding out that the reality you have been looking at and working in all these years is in fact some other reality.\textsuperscript{32}

While searching for answers to anomalies, in quest of a different paradigm, Nikolai A. Bernshtein\textsuperscript{33} sought some other reality concerning movement. In the 1930s he was researching the dynamics of movements and thought that "movement" is whole, not a step-by-step process. He devised an experiment in which the subject is dressed in black leotards and tights with small white disks around her ankles, wrists, and other joints and is dancing against a black background. A film of the dancing revealed a complex movement which is flowing, but definitely not analyzable as steps or discreet motions.

However, the whole movement of Bernshtein's dancers can be "Fourier-analyzed," and he was able to predict the continuation of a dancer's movements. Fourier-analysis, known as the Fourier transform,\textsuperscript{34} is a translation of movements, shapes, or information into sine and cosine waves, which are flowing rather than discreet. An everyday example could be that of teaching a child to ride a bicycle. After telling her to hop on, then how do you explain what to do? Riding a bicycle is a whole movement; the body is using several actions simultaneously. Another example is Karl Pribram's work on consciousness.
and memory. His notion is that the brain translates experience throughout the brain and does so in Fourier transforms.

Fourier transforms are also used in the mathematical representation of holography, and the combination of evidence for interference and Fourier decomposition of objects into frequencies indicates that something very similar in mathematical form to holography takes place in the brain. Pribram believes that in addition to vision and hearing, movement and physical action are also encoded in a Fourier form, in fact that everything we experience as perception and movement exists at another level as a Fourier 'frequency domain' or implicate order.35

The implicate order: this is not the Land of Awe, the reductionist view of reality, but another reality; the implicate order is an indivisible insight.

The new form of insight can perhaps best be called Undivided Wholeness in Flowing Movement. This view implies that flow is, in some sense, prior to that of the 'things' that can be seen to form and dissolve in this flow. One can perhaps illustrate what is meant here by considering the 'stream of consciousness.' This flux of awareness is not precisely definable, and yet it is evidently prior to the definable forms of thoughts and ideas which can be seen to form and dissolve in the flux, like ripples, waves and vortices in a flowing stream. As happens with such patterns of movement in a stream some thoughts recur and persist in a more or less stable way, while others are evanescent. (Bohm)36

Seeking the interpenetration of reality intrapenetrated, leaving the Land of Awe in quest of a different paradigm, it is essential to forage the incessant transformations of

- the implicate order
- irreversibility
- dissipative structures
• nonlocal planes

in an uncontrollable frenzy with language and the activity of writing
in which the explainer is the explained at the moment she is explaining.
Notes


It will be useful to continue his point:

"We are good at it. So good, we often forget to put the pieces back together again.

This skill is perhaps most finely honed in science. There we not only routinely break problems down into bite-sized chunks and mini-chunks, we then very often isolate each one from its environment by means of a useful trick. We say 'ceteris paribus' - all other things being equal. In this way we can ignore the complex interactions between our problem and the rest of the universe."

4. Although this is an unspoken oath, scientists have repeatedly claimed that the observed is what can be measured, and hence, what is real. Anything else is said to be simply metaphysical and unrelated to what is measurable. Werner Heisenberg changed this notion with his "uncertainty principle."

York: Simon & Schuster, Inc. 1984. p. 100. In Briggs' and Peat's text this quote is used to argue against fragmentation. As the quote is taken out of context for the purpose of my fairy tale, the remainder of the quote is provided here.

"And it's not only science. A moment's reflection will reveal how virtually every aspect of human thought relies on the notion of parts. An instant's reflection reveals the magnitude and pervasiveness of this subtle, tyrannical and apparently inescapable assumption."


7. Ibid., p. 150.

8. Ibid., p. 87-97. In 1926 Niels Bohr, Werner Heisenberg, and Wolfgang Pauli met in Copenhagen to debate interpretations of quantum mechanics. See note 9 in the text for further explanation.

9. Ibid., p. 152.


The counter argument to the reversibility of time is a major aspect of this dissertation. At this moment (and I use that phrase with all the immensity of meaning it entails), it is necessary to state the importance of "history." Prigogine and Stengers, op. cit., p. 215:

"Time has penetrated not only biology, geology, and the social sciences but also the two levels from which it has been traditionally excluded, the microscopic and the cosmic. Not only life, but also the universe as a whole has a history; this has profound implications."


Pagels actually argues against ahistorical systems. The micro-world could be reversible, but the macroworld, "the macroworld of human experiences," is irreversible.

"The fact that we cannot logically proceed from a microworld to macroworld description without introducing a new assumption has implications for the philosophy of material reductionalism. In its crudest form, material reductionalism maintains that there is a series of levels. At the bottom level are the subatomic particles, and from these the chemical properties of atoms and molecules are obtained. Molecules form living and nonliving things, and from the behavior of molecules and cells it is possible to determine the behavior of individual humans. They in turn establish a social order and
institutions. Finally at the top level of the ladder are historical events. The claim is that in principle, history is materially reducible to subatomic events.

But it is clear from our discussion of how the arrow of time is established that such a reduction is impossible even from the level of macroscopic objects to atoms. A meaningful macroworld description involves an averaging that washes out information of the microworld, and it is we who average." p. 131. (Emphasis mine.)

15. Ibid., p. 104.

Ford levels her attack upon the worst of the scientific profession and asks "Who will speak for the positivists?" She brings out the concept of "corresponding set of operations" found in Bridgman, P. W. **The Logic of Modern Physics.** London: Macmillan. 1927.
Her attack is worth the reading:

Bridgman's argument is quite simply that to be meaningful a variable must be defined in terms of the measurement operations that would be involved in detecting reality. This view is usually termed operationism (though sometimes referred to as operationalism) and it amounts to the methodological assertion that any variable which cannot be directly represented by a measurement operation has no place in science. Thus a hypothesis like "Those rabbits will be afraid" is regarded as meaningless. However, the statement "Those rabbits will be seen to be emitting more faecal boluses per hour than is normal for rabbits' is perfectly meaningful as far as Bridgman and his men are concerned. Fear, then, is meaningless to the operationist but an observably increasing defaecation rate does have meaning. (Notice incidentally that Cockneys seem to think that Bridgman has a point: the Cockney rarely says 'Huck is afraid,' instead he says 'Huck is shitting himself.') Ford op. cit., p. 149.


Berlin favors the repetitive and the universal instead of the specific and the unique.

Other sources are

Another example is found in Jantsch, Erich. op. cit., p. 49, turned "hysteresis."

"At each instability threshold there is a choice among several (at least two) possibilities... The structure 'remembers' the initial conditions."
p. 77.
33. Bernshtein, Nikolai Aleksandrovich. *The Co-ordination and
See also *Human Motor Actions. Bernstein Reassessed.* Whiting,
This text contains Bernshtein's chapters from his 1967 publica-
tion along with "two original chapters provided by scientists
from an international forum." Two pertinent chapters are
"Frequency Encoding in Motor Systems" (pp. 121-156) by K. H.
Pribram, A Sharafat, and G. J. Beekman and "From Action
Gestalts to Direct Action" (pp. 157-168) by E. S. Reed.
"Although [Bernshtein] discussed in detail only two problems
and emphasized the simplified case of coordinating a single
link-joint system, a science, like a movement 'never responds
to detailed changes by a change in its detail; it responds
as a whole to changes in each part.'" (p. 157).
34. See Murray, J. D. *Lectures on Nonlinear-Differential-Equation
p. 359-361. The Fourier transform is a complex mathematical
device, but it does allow the compilation of wholes, albeit
with breathtaking equations, as Bernshtein has shown.
"Any function \( w(x) \) satisfying the zero-flux conditions can be written in terms of a series (Fourier) expansion of eigen functions \( e_k(x) \) and so also can derivatives of \( w(x) \) which we assume exist. Let

\[
 w_{xx}(x) = \sum_{k=0}^{\infty} a_k e_k(x) = \sum_{k=0}^{\infty} a_k \cos knx
\]

where, in the usual way,

\[
 a_k = 2 \int_0^1 w_{xx}(x) \cos knx \, dx, \quad k > 0
\]

\[
 a_0 = \int_0^1 w_{xx}(x) \, dx = \left[ w_x(x) \right]_0^1 = 0.
\]

Then integrating [the first equation] twice and using conditions \([w_x(x) = 0 \text{ on } x = 0, 1]\)

\[
 w(x) = \sum_{k=1}^{\infty} \left( \frac{a_k}{n^2} \right) e_k(x) + b_0 e_0
\]

where \( b_0 \) is a constant as is \( e_0 \). Thus, since \( a_0 = 0 \),

\[
 \int_0^1 w_x^2(x) \, dx = \left[ w_x \right]_0^1 - \int_0^1 w_{xx} \, dx
\]

\[
 = - \int_0^1 w_{xx} \, dx.
\]
\[ \int_0^1 \left( \sum_{k=1}^\infty \frac{a_k}{x_k^2} \cos k\pi x \right) \left( \sum_{k=0}^\infty a_k \cos k\pi x \right) dx \]

\[ + b_0 \phi_0 \int_0^1 \left( \sum_{k=0}^\infty a_k \cos k\pi x \right) dx \]

\[ \leq \frac{1}{2\lambda_1} \sum_{k=1}^\infty a_k^2 \]

\[ \leq \frac{1}{\lambda_1} \int_0^1 w_{xx}^2 dx = \frac{1}{\pi^2} \int_0^1 w_{xx}^2 dx, \]

which is: \( \lambda_1 \) is the smallest positive eigenvalue \( \lambda_k \) for all \( k \).

The proof of the general result simply mirrors the above one-dimensional scalar version." ("Simply mirrors"? Who are they kidding?)


Chapter Two

Implicate Order: Simultaneity of Interrelatedness

0 body sway to music, 0 brightening glance,
How can we know the dancer from the dance?
William Butler Yeats

In the dancing fray of the explainer and explained at the moment of explaining is a world, in Alfred North Whitehead's terms, which is "divisible but not divided," the interconnectedness of entities simultaneously related to each other and to themselves. Simultaneity is an ongoing, and historical, manifestation of consciousness and matter in a nonlocal order arising from disorder. Carl Jung wrote a forward to the I Ching (1949) in which he describes the coinciding of psychic and physical phenomena as "synchronicity," which may elucidate simultaneity at the moment of explaining.

Just as causality describes the sequence of events, so synchronicity...deals with the coincidence of events... How does it happen that A', B', C', D', etc. appear all in the same moment and the same place? It happens in the first place because the physical events A' and B' are of the same quality as the psychic events C' and D', and further because all are the exponents of one and the same momentary situation.1

Simultaneity, furthermore, is the inseparableness of entities that we speak of as divisible but not able to be divided, a profound elasticity of reality; simultaneity is not an illusion but an insight, i.e.,
the internal glimpse of reality tempered by the external as the external is moderated by the internal. Without the insight of simultaneity, reality is rendered the reductio ad absurdum of physics and the hard sciences (as in the Land of Awe) whereby things are divided and disconnected with each part of reality being considered as self-existent. David Bohm, a theoretical physicist, captures this insight.

Even though physics is by now a rather specialized profession, and even though the question of metaphysics is discussed seriously by hardly more than a handful within this profession, the world view that physics provides is clearly still playing a crucial role as a foundation for the general mode of thinking that prevails throughout society. It is therefore important to ask whether modern physics necessarily implies a universe that is beyond intuitive and imaginative comprehension, as well as whether this universe is without any deep meaning, and is only something that can be computed mathematically and manipulated technically. If the conclusions drawn from modern physics are found to be wrong in this respect, then this may help open the way for the truly creative and original step that is now required of mankind. This step would not be merely a reaction to the breakdown of the modern world order, but would arise out of a genuinely fresh insight, that would help make it possible for mankind to move out of the morass into which it has been sinking. And in view of what has just been said, the possibility of a post-modern physics, extended eventually to a post-modern science, may be of crucial significance for this sort of insight. Such a post-modern science would not separate matter and consciousness...²
Reality is not parts which make up a whole, it is not seeing the whole as more than the sum of its parts in interaction, for reality is an "invisible flux that is not comprised of parts. It is inseparable interconnectedness." (Bohm) Wholeness: inseparable interconnectedness; the holonomy of an implicate order, human activity, activity of consciousness, and the activity of language. "After all, the totality includes not only all that has been discovered about nature by all science, but also us, our language, our thoughts, feelings, and intelligent perceptions..."³

In Bob Samples' Mind of Our Mother there is a straightforward working definition of holonomy.

holonomy n. (Gr. "holos," entire, complete, whole and "nomos", a law or rule) The science or systematic study of wholes, of entire systems. Basic to holonomy is the simultaneous interrelatedness and interpenetration of all phenomena. Basic to holonomy is the assumption of unity and oneness as opposed to fragmentation, isolation, and separateness.⁴

In The Silent Pulse⁵ George Leonard states it succinctly in that the holonomy is "in the nature of the hologram." The hologram is a physical metaphor first employed by Karl Pribram⁶ as an aid in explicating thought and memory. In using holography as a metaphor⁷ it is essential to know that it is a metaphor and not a model for a model defines a finite structure. The metaphor, rather, allows for the transfer from that which it designates, through implicit transformations, to its comparison.
"Holography is a method of lensless photography in which the wave field of light scattered by an object is recorded on a plate as an interference pattern. When the photographic record—the hologram—is placed in a coherent light beam like a laser, the original wave pattern is regenerated." (See Figure 11.)
The hologram permits a three dimensional representation of the structure which is illuminated. The whole of the original structure can be seen, while at the same time, the observer can see the whole from different points of view or vantage points. Moreover, in holography a small region of the plate can be illuminated, and the whole structure will still be seen. When only a part is illuminated, the whole structure is seen in less defined detail, but, nevertheless, the whole will be seen. Bohm's metaphor, then, is that the whole illuminated structure is "undivided wholeness." The attempt to separate regions of the photographic plate does not destroy the whole. The simultaneous interrelatedness of the structure illuminated maintains its unity.

How is unity maintained by simultaneity? To continue with Bohm's metaphor, since each region contains the total structure, it follows that the structure is "enfolded" in each region. Each region, when separated, illuminates the whole in less defined detail which Bohm terms "in an implicate way." What is enfolded in the implicate order is "carried" or moved by an explicate order which is unfolding.

This is not to be understood, however, as a hierarchy, unfolding to enfolding or explicate order up to implicate order, which presupposes levels, ranking, or sequentiality. Instead, it is the simultaneity of nonlocal planes from which unity is derived. In order to obliterate the regular reductionist response we are trapped in, it is clarifying to pursue Alfred North Whitehead's reasoning on reality as a prelude to the implicate order. Whitehead did not succumb to the
positivistic stance of studying or analyzing the lowest levels working up through the intermediary levels to the highest levels. He flipped the hierarchial approach to reality the other way round, and surmised that the highest occasions or entities (levels, as they are referred to) be studied in order to illuminate the lower entities. The simple, yet superb, conclusion is that all of the lower entities are contained in the higher, and thus, to know the higher entails knowing a unity. If the lower entities are studied in order to know the higher, as studying the parts to understand the whole, then one must calculate a route from atoms & subcellular parts to creativity and human volition. Ken Wilber further explains Whitehead's reasoning:

...you first look to the higher levels for the general principles of existence, and then, by subtraction, you see how far down the hierarchy they extend. You don't start at the bottom and try to move up by addition of the lower parts, because some of the higher parts simply don't show up very well, or at all, on the lower rungs... In the lower dimensions, the creativity gets reduced, appearing in humans as a modicum of free will but being almost entirely lost by the time you get to atomic particles... But the point is that if you try to understand the cosmos in the reverse direction, from atoms up, you are stuck trying to account for free will, for creativity, for choice, for anything other than a largely deterministic cosmos.11

Hence, avoiding the regular reductionist response of hierarchies, by looking through systems simultaneously rather than from lower to higher sequentially, it is possible to comprehend simultaneous unity
in the implicate order. There is progressive self organization in which relatively autonomous subtotalities proceed at a moment which make the undivided wholeness.

Three examples of analogical extension follow. The first is music, the second is language, and the third is writing activity.

When a musician is playing an instrument, e.g., a piano, the musical transcriptions are translated into hand and eye (physical) and cognitive (mental) movements on the piano which make up the performance. The performance is "carried" by sound waves. A listener's experience of hearing the performance is carried in the implicate order. The listener may care to understand the performance in the explicate order by checking the "manifest" parts of the performance, i.e., the tangible aspects.

What, then, is the meaning of the appearance of the apparently independent and self-existent 'manifest world' in the explicate order? The answer to this question is indicated by the root of the word 'manifest,' which comes from the Latin 'manus,' meaning 'hand.' Essentially, what is manifest is what can be held with the hand - something solid, tangible and visibly stable. The implicate order has its ground in the holomovement which is . . . vast, rich, and in a state of unending flux of enfoldment and unfoldment, with laws most of which are only vaguely known, and which may even be ultimately unknowable in their totality. Thus it cannot be grasped as something solid, tangible and stable to the senses (or to our instruments). Nevertheless, . . . the overall law (holonomy) may be assumed to be such that in a certain sub-order, within the whole set of implicate order, there is a totality of forms that have an approximate kind of recurrence, stability and
separability. Evidently, these forms are capable of appearing as the relatively solid, tangible, and stable elements that make up our 'manifest world.' The special distinguished sub-order indicated above, which is the basis of the possibility of this manifest world, is then, in effect, what is meant by the explicate order.\textsuperscript{12}

The tangible aspects in this example are the musical score, the piano, the playing of the notes. The total experience is enfolded in the implicate order while the manifest aspects are "unfolded" in the explicate order. The listener and the musician are unfolded in the explicate order which is enfolded or carried in the implicate order of the experience.

All that is primary, independently existent, and universal is thought to be expressible in an explicate order, in terms of elements that are externally related. . . Our proposal to start with the implicate order as basic, then, means that what is primary, independently existent, and universal has to be expressed in terms of the implicate order. So we are suggesting that it is the implicate order that is autonomously active while, as indicated earlier, the explicate order flows out of a law of the implicate order, so that it is secondary, derivative, and appropriate only in certain limited contexts. Or, to put it another way, the relationships constituting the fundamental law are between the enfolded structures that interweave and inter-penetrated each other, throughout the whole of space, rather than between the abstracted and separated forms that are manifest to the sense (and to our instruments).\textsuperscript{13}

In this example, the order of the whole structure of the event is enfolded and carried in a "movement" which allows the development of the
structure to emphasize the undivided wholeness, the flow. According to Bohm, what "carries" the implicate order is the "holomovement" which is an unbroken and undivided totality. The manifest aspects of the holomovement, i.e., the sound, the piano, the music, can be unfolded, but all forms of the holomovement merge and are inseparable. The musician is the music at the moment he is playing. The holomovement, then, is the ground of everything, and the holomovement continually cascades in the implicate order because everything implicates everything else in an order of undivided wholeness. Hence, reality is in the implicate order. "The holomovement is the reality... what is going on in the full depth of that one moment of time contains information about all of it." 

Reality is not in the explicate order with the manifest aspects; this is what Bohm refers to as the "ripples" of reality. Analytic description explains only the ripples, not the wholeness. The fragmented, atomistic reduction is an analysis of that which is superficial. The meaning of any whole is not the manifest aspects, although these aspects are in the explicate order which is contained in the implicate order, for their meaning depends on understanding what underlies the ripples.

Ripples may also be understood in terms of Edward T. Hall's "extension transference," E.T. E.T. is an "intellectual maneuver in which the extension is confused with or takes the place of the process extended." The transferred phenomenon is treated as the only reality. Education becomes confused with learning when education is viewed as an
extension transference. The E.T. can enhance a particular function, e.g., language and mathematics enhance aspects of thinking, but language and math are not the totalities; they are the subtotalities, that which has been extended.

Yet, subtotalities may be investigated. The implicate order is primary and is from which the parts are derived, which are the abstractions from the whole. They are "approximately separable, stable, and recurrent, but externally related elements making up relatively autonomous sub-totalities." (Bohm) The subtotalities are then pronounced in terms of the explicate order, since they are not the final validity, but a constant gyration toward the flow, the whole.

It is implied here, however, that even such a 'new whole' will itself be revealed as an aspect in yet another new whole. Thus, holonomy is not to be regarded as a fixed and final goal of scientific research, but rather as a movement in which 'new wholes' are continually emerging. And of course this further implies that the total law of the undefinable and immeasurable holomovement could never be known or specified or put into words. Rather, such a law has necessarily to be regarded as implicit.17

The flow is the holomovement; what is is the holomovement. The holomovement enfolds and unfolds in a multidimensional order and is effectively infinite. The holomovement is enriched by proliferation from the three dimensional, manifest, to the multidimensional, non-manifest, implicate order. In its totality, the holomovement is the reality of the whole in the depth of each moment of time. The law of
the holomovement becomes the possibility of abstracting a set of relatively stable subtotalities from the immeasurable domain of the holomovement which is implicit.

The second example of analogical extension is language which is abstracted from relatively stable subtotalities of the implicit holomovement. The abstractions are consciousness, memory, and activity.

Consciousness is to be understood in terms of the impliciate order and is the development of thought, desire, will, and feeling. Energy, which includes waves and matter, and is in constant movement, enfolds information concerning the universe. All this information comes through the senses. Figure 12 is an interpretation of this interrelationship. Information enters the sense organs, and then travels through and about the nervous system to the brain. In the brain memories of the information are recorded all over the brain, and memory is transformed when other information is enfolded. The diagram looks distinctly like Figure 11, the hologram, which is precisely the point. The memories recorded all over the brain are like the hologram in function. A memory, like a part illuminated from the whole structure in a hologram, is not merely extracted from the brain as a part, but as a whole structure. There is a constant and simultaneous activity, the simultaneity of the interactions of the whole. Thus, there are not discrete memories in the
Figure 12. Interrelationship of Energy, Information, and Brain.
brain but active transformations. Information is in the explicate order which is enfolded into the implicate order. There is a continuation, the simultaneity of interactions, of content that is explicate which is enfolded into the implicate which unfolds into the explicate, and back again, and so on.

This continuation enunciates consciousness as having a manifest content based on memory, memory which is organized and represents the manifest or explicate order of the world of that which has been enfolded. Consciousness includes thought, and "an enfolded order is grasped in thought." Furthermore, Lev Vygotsky, development psychologist, linguist, philosopher and psychopathologist, explains that "thought is completed in language."

In order to explain the highly complex forms of human consciousness one must go beyond the human organism. One must seek the origins of conscious activity and 'categorical' behavior not in the recesses of the human brain or in the depths of the spirit, but in the external conditions of life. Above all, this means that one must seek these origins in the external processes of social life, in the social and historical forms of human existence.

In seeking the origins of conscious activity, one will find them in the external, i.e., manifest processes of life. The manifest processes are enfolded, then, into consciousness which is unfolded or made manifest back into the explicate order. This is the simultaneity of interrelatedness in that the enfolded or implicate order is grasped in thought and that thought is completed in language, language being the manifestation
of thought. Moreover, as A. R. Luria, neuropsychologist, stipulates, consciousness "is not a question of assimilation of material stimuli. Rather it is a question of processing the highly complex information which reaches humans. They process this information through sense activity and with the help of language." And, proceeding from Bohm, "The human is fundamentally changed in the very activity in which his aim is to change that reality which is the content of his consciousness."

"Activity" is a ponderous principle but has interanimate ramifications for undivided wholeness. The term will be used in the Soviet psychological concept of activity, particularly as Aleksei Nikolaevich Leont'ev explains that "activity represents a process that is characterized by continuously proceeding transformations." Hence, in relation to the implicate order, activity enfolds all entities, that is, activity is in the implicate order. Activity is not the holomovement; activity is implicate while both, activity and implicate order, are contained in the ground of the holomovement. The holomovement cascades activities.

Thus in the total flow of activity that forms human life, in its higher manifestations mediated by psychic reflection, analysis isolates separate (specific) activities in the first place according to the criterion of motives that elicit them. Then actions are isolated - processes that are subordinated to conscious goals, finally, operations that directly depend on the conditions of attaining concrete goals.

The 'units' of human activity also form its macrostructure. The special feature of the analysis that serves to isolate them is that it does so not by means of breaking human activity up into elements but by disclosing
its characteristic internal relations. These are the relations that conceal transformations that occur as activity develops.\(^{22}\) (emphasis mine.) (See Figure 13.)

Therefore, in terms of undivided wholeness, the flow of activity, which is in the implicate order, has as its manifestations actions and operations unfolding from the explicate order which enfolds the implicate order of the activity. In other words, actions and particularly the isolatable operations are relatively autonomous subtotalities which are separable, stable, recurrent, and externally related. These subtotalities, in turn, may be investigated, all the while working in terms of the implicate order, the whole, and then deriving the subtotalities.

P. Y. Gal'perin posits a similar process in the development of mental acts.\(^{23}\) Actions and operations have their origins in the interrelations or exchanges of activities. An operation is the result of a transformation of an action that is the result of a transformation of an activity. (Unfolding, enfolding, unfolding, enfolding, etc.) However, there is no separateness in relation to operations to actions to activities.

As an illustration, the first example of the musician as the music at the time he is playing will correlate with and to the implicate order and the concept of activity. (See Figure 14.)

From the illustration, the recurrent, stable, externally related parts of musicianship are manifest as are the somewhat less manifest parts ("less subtle," Bohm), both of which are subtotalities. These
Figure 13. Transformations of Activity.
<table>
<thead>
<tr>
<th>Implicate Order</th>
<th>Concept of Activity</th>
<th>Musicianship</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Actions  Purpose</td>
<td>Actions: Physical and mental movements. Purpose: Interpret musical score.</td>
</tr>
<tr>
<td>Manifest (explicate order)</td>
<td>Operations Conditions</td>
<td>Operations: Musical score. Conditions: Piano, piano bench, light, etc.</td>
</tr>
</tbody>
</table>

Figure 14. Implicate Order/Activity/Musicianship.
may be investigated in various ways, even to the point of analyzing the musical instrument as to tone and pitch, but all the while these may only be investigated, not as discreet parts, but as subtotalities of the whole, of the undivided wholeness of the total activity of the musical experience. If the subtotalities are analyzed as discrete units, they then represent merely the ripples of reality. The activity depends upon understanding what underlies the ripples, the nonmanifest or implicate order of reality.

Having outlined the abstractions of consciousness, memory, and activity, the example of language is presented. It is tempting to relegate language to the nonmanifest while the grammar of a language is less manifest and the morphemes and phonemes are manifest operations; yet, this would be erroneous. The analogical extension allows that consciousness is in the implicate order and is grasped in thought. Thought is completed in language. Therefore, language is a manifestation of thought and is in the explicate order, a subtotality of consciousness. In this manner it is true that language is separable, stable, recurrent, and externally related and able to be investigated. As a manifest operation of thought enfolded in consciousness, it is possible to also state that as a subtotality it operates under certain conditions and limitations in a corresponding total situation.

The total situation is the social-historical-cultural milieu of society which is then enfolded in the less manifest and the nonmanifest which, then in the implicate order through active transformations,
unfolds in the explicate order as the simultaneity of these interrela-
tions are continuous. Language is a "a function of apprehension, i.e., a
reflection of objective reality which is refracted through the prism
of socially accumulated and generalized experience embodied in language.
The reflection of phenomena of the surrounding world in the human mind
in the form of consciousness is an act of language." Language is
inexorably social, the significance of which is found in a person's
activity which includes the person's motives, purposes, and conditions.

Language generalizes the socio-historical
experience of mankind and passes it on to
separate individuals; consequently, it is a
condition which ensures the appropriation
of mankind's sociohistorical experience by
individuals, and a form of its existence in
their consciousness.

The socio-historical participant (experiencer) is the socio-historical
experience at the moment of the participation (experiencing).

The last example of simultaneous unity by analogical extension
in which there is progressive self organization of relatively auto-
nomous subtotalities will be writing. It is misleading, delusive, to
propose that writing is a particular process, or that it is merely a
concept involving a process. Writing is not is; writing becomes. The
activity of writing becomes the dialectical dialoguing of the writer's
nonlocal language planes throughout the implicate order of cascading
movements. In other words, the activity, the continuously proceeding
transformations of motives, goals, and conditions that occur as activity
develops, of writing becomes, i.e., the basic unity of reality is the
relation which becomes in an expanding continuum, the dialectical
dialoguing which is the tension created in not being able to write one
aspect of a thing until every aspect becomes the restatement of the total
exposition; this dialoguing happens within and through the writer's
nonlocal language planes - the planes of the writer, the dynamics of
the written, the irreversibility of the writing, the dissipative
structures forcing more outcomes, and the full depth of the moment of
each plane - in the implicate order which is ground in the holomovement
of the unending flux of enfolding and unfolding of cascading movements
whereby each/every movement is the input of the output of the input of
the next. Hence, writing becomes.

To break out of the seemingly labyrinthine activity of writing
becoming, Figure 15 is provided as an explicate, manifest form of
writing becoming a new whole. The nonlocal planes are depicted in
circular forms, not as sequential localities, but as evolving planes in
an implicate order of ongoing movement. Between the planes are
dialectical dialogues, or the conflicts, which impinge upon one another
as the activity becomes whole.

The writer is implicated in the development of his activity through
his motives and goals which coalesce because of the process of mental
reflection within the individual buffered by an element of anticipation
toward the external, manifest world. Without motives and goals, the
writer does not develop his activity of writing.

Activity... is a real relationship between
subject and object in which the mind is a
necessary component. In performing any
Figure 15. Writing Becomes a New Whole.
activity, the individual must perceive, remember, think, and be attentive; in the course of activity, emotions arise in him; and qualities of the will, attitudes, and relationships are shaped and become manifest. An activity in the course of which a human being does not perceive, think, or experience - such an activity simply cannot exist. If there are no motives in the individual inducing him to some activity, if he has no goals, if he does not perceive the objects (or their models) with which, or by means of which, he acts, if he does not remember what he is to do and how he is to do it, then activity does not take place, even though the object, the means, and all the necessary conditions for it may be present. In brief, the entire system of processes, states, and properties commonly referred to as mental are shaped, developed, and become manifest in activity.  

Again, an unmotivated and goal-less activity does not exist. The motive corresponds to a need which propels a writer to write, while the goal corresponds to the more manifest object or external need toward which the writing activity is developed. When motives and goals coalesce they demarcate a "vector" of activity "which determines both its direction and the amount of effort developed by the subject in performing the activity. The vector acts as a system - forming factor that organizes the entire system of mental processes and states, formed and developed in the course of activity."  

Within this vector of activity, the motive is the reflection of a need, the individual's need to write for self and the further need for the writer to amalgamate her writing with the logical constructs of her society. Although reflections of needs are mediated by the society, the writer does not copy the society. The motive is internal or
nonmanifest and is externalized by the goal which applies meaning to concrete, manifest, activity.

By goal we mean an idea in a person's mind, the subject of a future result of an activity, which precedes the carrying out of that activity and determines the nature and modes of actions. In other words, a goal is a phenomenon of anticipatory reflection.28

Reflection is unbound in the implicate order of the writer, an action within itself, as the writer reflects her needs propelling her motives and goals to that which is written.

Reflection, as a universal property of matter, is the ability of a material entity to reproduce, in the corresponding changes of its properties or states, the peculiarities of other bodies that affect it.29

Matter, in this instance, the written text of the writer, exists spacially and temporally. The text, however, does not merely exist; it acts, influences, corresponds to, changes the writer. The written text affects the writer, and the writer affects the written text, as the writer anticipatorily reflects what he is writing simultaneously as he is writing. The action within itself construes the reflection of the writer and what he is writing. The peculiarities, i.e., features, of what is written are "reproduced" or changed by what the writer has previously written in this particular space and time and by his past socio-historical experiences that decidedly affect his writing in this total relationship. In this way a first body of matter, be it the writer or his writing, affects a second body of matter; this second body, while being affected, also affects the first body such that "... any
interacting material entity is both reflecting and reflected."^30

Thus, any written portion of a writer's activity is the external condition for more writing, which in turn, relies upon the anticipatory reflection of a goal, which in turn, originates from a motive which is an internal incentive to activity. And, as the development of activity is a process of mental reflection, such that activity is both reflecting and reflected, the motive incites the implicate memory, will, emotions, attitudes, and relationships of the writer to a more concrete goal which determines the dynamics of what is to be written into the explicate conditions of a written text. (See Figure 16.)

The dialectic dialoguing is movement, a fluxion.\(^31\) During the fluxion, dialogue is the exchange of ideas. "Dialogue implies immediate unprescinditated utterance. It consists of replies, repartee; it is a chain of reactions."\(^32\) This chain of reactions, incessant movement, discloses the dialectic nature of the fluxion within and through the writer's nonlocal language planes.

To act and think dialectically, particularly as the writer is her writing as she writes, the writer is juxtaposed with her "thought to the second power," as Fredric Jameson refers to the living experience of dialectical thinking. This thinking to the second power creates the tension, the conflict or dilemma, in which every aspect of the process becomes a restatement of the total exposition so that the conflict becomes resolved only to spur another conflict from the previous resolution. The intermittent conflict-resolution fluxion of the writer's thinking as she writes authorizes the movement which culminates in that which is written.
Figure 16. The Writer.
[Dialectical thinking] is, of course, thought to the second power: an intensification of the normal thought processes such that a renewal of light washes over the object of their exasperation, as though in the midst of its immediate perplexities the mind had attempted, by willpower, by fiat, to lift itself mightily up by its own bootstraps. Faced with the operative procedures of the nonreflective thinking mind (whether grappling with philosophical or artistic, political or scientific problems and objects), dialectical thought tries not so much to complete and perfect the application of such procedures as to widen its own attention to include them in its awareness as well: it aims, in other words, not so much at solving the particular dilemmas in question, as at the converting those problems into their own solutions on a higher level, and making the fact and the existence of the problem itself the starting point for new research. This is indeed the most sensitive moment in the dialectical process: that in which an entire complex of thought is hoisted through a kind of inner leverage one floor higher, in which the mind, in a kind of shifting of gears, now finds itself willing to take what had been a question for an answer, standing outside its previous exertions in such a way that it reckons itself into the problem. . .33

What this intimates is that the fluxion, the dialectic dialoguing, is autocatalytic; in effect, it becomes self-organizing, it feeds upon itself as what is written is recaptured from what was previously written. The dialogue or repartee between the writer and what he writes is dialectical as it unravels itself which is its organization, the conversion of conflicts into resolutions into conflicts autocatalytically as the activity of writing both consumes and frees the writer. The fluxion, then, links, indeed ensnares, the nonlocal language planes as the activity of writing becomes a new whole. (See Figure 17.)
Figure 17. The Dialectic Dialogue.
Just as Alfred North Whitehead admonished - look from the higher down through the lower, the dynamics of what is written proceeds from the writer's thoughts through his inner speech to the written words.

Every thought tends to connect something with something else; it has movement, flow, development - in short, it fulfills a function, solves a problem.

... thought is always a whole, considerably larger in its extension and scope than an individual word ... In his mind, the whole thought is present at once.34

An enfolded order is grasped in thought, and thought is completed in language. Thoughts produce conflicts, the resolution of which is the relating of one entity with another entity. This action of relating is developmental.

The relationship between thought and language is not a thing, but a process, a continual movement back and forth from thought to word and from word to thought. Viewed in the light of a psychological analysis, this relation is a process that passes through a series of phases and stages, during which its essential features undergo changes that may be called development in the strict sense. Of course, this is a functional development, not development in the sense of aging; but the path traversed by thinking as a process from thought to word is development nonetheless.

Thought is not expressed in words; it comes into existence through them.35

"A thought may be compared to a cloud shedding a shower of words."36

Words, once written down, are encapsulated into a static existence.
They are reified, and Goethe is even stricter: "The word dies in the pen." Without the recognition of the writer's sociohistorical background brought to bear upon the words she writes, those written words are the palisades, the poles forming a defense barrier, from a dictionary. There is no movement, no flow. In diametric contrast, however, when the words are enchantments and re-enchantments of the writer's own life, the social history she emanates from, through, in, and continues with, then her words become aswarm with meanings; the movement returns and returns. The movement began with the writer's external speech which later becomes internal to resurface again, later, and again in external speech and in the written word.

The child's speech is external first, occurring in the child's social relationships. From the first day of the child's life, the developmental interplay of speech is woven into the social history of the child, the proliferation of the child's primary social interactions ensuing in and through words. Later, this external speech becomes internalized in the child. This internalization is not the internalization of external speech forms, but rather it is the "interpsychological activity" of social relationships that is internalized as the activity becomes "intrapsychological," from interspsychological relationships with the society to the intrapsychological relationships of the child's own mental reflection.

Intrapsychological activity begets inner speech. In the contrapun- tal maneuver of the movement between thought and words is inner speech, the hinge of the movement, the function permitting the pivoting
of thought to words and words to thoughts. Inner speech is elusive, evasive, much as a hinge provides the wherewithal for movement but is not the movement itself. In effect, it is the potential for the movement.

[Inner speech] is a dynamic, shifting, unstable thing, fluttering between word and thought, the two more or less stable, more or less firmly delineated components of verbal thought.38

This hinge is not speech to oneself. It is directive, although abbreviated, and allows the planning or regulation of external speech and writing. It has a "predicative" nature in that a writer's inner speech assists in the solving of a problem, a problem which the writer knows and must subsequently externalize through the written word. Inner speech is the hinge which pivots the implicit into the explicit.

A word, then, is not relegated to a palisade of meaning but is saturated with the writer's socio-historical sense in the contrapuntal maneuver by which the implicit becomes explicit.

The other properties of inner speech have to do with the sense principle of semantics. Agglutination, which is a way of forming discrete, complex words to express complex concepts, enables the influence of sense to make itself felt. 'The senses of different words flow into one another - literally "influence" one another -- so that the earlier ones are contained in, and modify, the latter ones.' Because of this, 'in inner speech ... a single word is ... saturated with sense.'39
The mental reflections, actions within themselves which both reflect and are reflected, are hinged between thought and words, and words, in turn, influence and develop inner speech which develops thought. (See Figure 18.)

The irreversibility of writing is like the type of action in a dialogue between two people. What is said by one speaking partner cannot be taken back or become unsaid. An utterance may be modified, and a speaker may even pronounce her intention of change: "I take that back. What I mean to say is ..." Yet, that very utterance does not blot that which was previously spoken, and furthermore, each utterance displaces the following utterance, modifying as it goes producing a cumulative effect. A speaker commences with a theme, the given information which is built upon by the second speaker's rhyme, or new information. As the dialogue continues, the rhyme then becomes an old piece of information which is altered and becomes a theme, and so on. This bantering, although the speakers may retrace their utterances all the while adjusting the themes and rhymes, is irreversible for the speakers.

In the activity of writing, the writer has a dialogue with herself, a monologue in which she has the realization of her own thoughts as themes supplant rhemes, and subsequently, rhemes replace themes in an ongoing dialogic monologue. In this instance, more so than at other junctures, the writer becomes what she is writing at the moment of writing as she realizes her own thought.

Moreover, this monologue captures the functions of revising and editing as the writer writes in this irreversible action. Just as the
Dynamics of the Written

Thought

Inner Speech

Word

mental reflection

develops

develops

Figure 18. Dynamics of the Written.
speaker may "take back" an utterance, in like manner the writer may "cross out" written utterances and modify what has been written which, nevertheless, transforms what is to follow. Written utterances and/or sentences migrate from the sentences which were previously written and henceforth predicate the sentences which are to follow in an irreversible forward movement.

My utterance, then, is motivated by my desire to formulate (express, develop, discover) a relationship, to make a point. So, I begin a monologue, a series of sentences that attempts to give the 'theme' linguistic form. I appraise each sentence as I utter it to discover the extent to which it contributes to the realization (expression, formulation) of the theme. Sentence 2, then, modifies, extends sentence 1, and sentence 3 (with sentence 1 and sentence 2 in mind) evolves out of the relationship of sentences 1 and 2. Each sentence, then, is governed (and helps to govern) by the theme that motivates this expressive, formulative, and heuristic activity in the first place.40

In this way, a manifest illustration is Figure 19.

We now know that far from equilibrium new types of structures may originate spontaneously. In far-from-equilibrium conditions we may have transformation from disorder...into order. New dynamic states of matter may originate, states that reflect the interaction of a given system with its surroundings. We have called these new structures dissipative structures to emphasize the constructive role of dissipative processes in their formation.41

The activity of writing is presented as a nonlinear relationship, as highly interrelated with the external society, as that which may
Irreversibility of the Writing

Figure 19. Irreversibility of the Writing.
begin with a single motive and then produce ever-increasing effects, and as self organizing as it becomes a new whole. These characteristics are indicative of a far-from-equilibrium system: "nonlinear relationships, inordinate sensitivity to external influences, small inputs which yield huge, startling effects, and the entire system may reorganize itself." In the far-from-equilibrium activity of writing, the transformations from nonlocal plane to nonlocal plane lead to higher planes of organization through its self organization. These transformations are vigorous, dynamic, and reflect and are reflected by the interactions of the total system on a micro- and macro-level; these are dissipative structures. On a micro-level the dissipative structures originate further dissipative structures as the randomness is arranged into higher levels of organization. On a macro-level the dissipative structures also arrange the new whole into higher levels of organization, from disorder to order as the cascading movements in the implicate order through the nonlocal planes merge and re-emerge among the dialectical dialogues of the activity of writing becoming; beginning, anew, the continuing. (See Figures 20. and 21.)

This third example of simultaneous unity by analogical extension is that writing is not is; the activity of writing becomes. This example becomes, and yet falters at this moment. "I have forgotten the word I intended to say, and my thought, unembodied, returns to the realm of shadows." These words are quoted in Thought and Language from a poem by Osip Mandelstam. The entire text of the poem follows as an endpoint to this activity of writing becoming.
Figure 20. Micro Dissipative Structures.
Figure 21. Macro Dissipative Structures.
Я слово позабыл, что я хотел сказать.
Слепая ласточка в чертог теней вернется,
На крыльях срезанных, с прозрачными играть.
В беспамятстве ночная песнь поется.
Не слышно птиц. Бессмертник не цветет.
Прозрачны гривы табуня ночного.
В сухой реке пустой челнок плывет.
Среди кузнецов беспамятствует слово.

И медленно растет, как бы шатер влк храм,
То вдруг прокинется безумной Антигоной,
То мертвой ласточкой бросается к вогам.
С стигийской нежностью и веткою зеленой.

О если бы вернуть в зрачах пальцев стыд,
И выпуклую радость узнаваний.
Я так боюсь раданы Аонид,
Тумана, звона и звонья.

А смертным власть дана любить и узнавать,
Для них и звук в персты прольется,
Но я забыл, что я хочу сказать,
И мысль бесплодная в чертог теней вернется.

Всё не о том прозрачная твердит.
Всё ласточка, подружка, Антигона... 
А на губах как черный лед горит
Стигийского воспоминанье звона.

I have forgotten the word I wanted to say.
The blind swallow will return to the hall of shades
On clipped wings to sport with the transparent ones.
In unconsciousness the night song is sung.

No sound of birds. No flower on the immortelles.
Transparent are the manes of the horses of night.
In the dry river floats an empty skiff.
Among grasshoppers unconscious lies the word.

And slowly it grows, as if a tent or temple,
Suddenly it will act the mad Antigone,
Or like a dead swallow cast itself at the feet
With a green branch and Stygian tenderness.

Oh, to bring back the shame of seeing fingers,
The convex happiness of recognition!
I am so fearful of the Muses' keening,
Of clangour, mist and yawning emptiness.

But mortals have the power to love and recognize,
For them sound too flows through the fingers,
But I have forgotten what I want to say,
And the bodiless thought will return to the hall of shades.

The transparent one clings to the same false note,
Swallow, beloved girl, Antigone...
But on the lips like a black ice there burns
The memory of Stygian clanging.
NOTES


2. Bohm, David. This long quote is from a personal communication to me, February 15, 1984: "I am sending you the first and last sections of a talk I am giving on the implicate order... the parts I am sending you are new. I think that you may be interested in them." This superb insight grew into a talk Professor Bohm later delivered entitled "The Post-Modern Physics and the Post-Modern World."


7. Ken Wilber warns us about the misuse or overuse of holography for
describing reality. "It's not so much those scholars, [David Bohm and Fritjof Copra] or ones like Marilyn Ferguson or Renee Weber who are trying to interpret their findings for us, that I have in mind when I criticize the pop mysticism and the new Physics or holographic craze. But definitely the holographic paradigm, in and by itself, falls into that pop mysticism, and I simply think that is a real problem." "Reflections on the New Age Paradigm - An Interview" in Wilber, Ken Eye to Eye. The Quest for the New Paradigm. Garden City, N.Y.: Anchor Books. 1983. p. 163. On the other hand, Bob Samples has nothing but praise for Pribram's use of the holographic metaphor. "The awesome cleverness of Pribram's research stands as its own beacon. His decision to use the mathematics of Fourier Transformations creates in itself a brilliant metaphor. The graphic expression of the results of such a transformation is a mandala - an expression in two dimensions of radial symmetry within the confines of mathematical relationships. Another attribute of the Fourier 'mandalas' is that the entire pattern can be regenerated from any shard of the data bound within the 'graph.'" Samples, Bob. "Holonomic Knowing" in Wilber, Ken (ed.). The Holographic Paradigm and Other Paradoxes. Boulder, Colo.: Shambhala Publications. 1982. p. 123.


1714 - Gottfried Wilhelm von Leibniz, discoverer of integral and differential calculus, said that a metaphysical reality underlies and generates the material universe. Space-time, mass and motion of physics and transfer of energies are intellectual constructs.

1902 - William James proposed that the brain normally filters out a larger reality.

1905 - Albert Einstein published his theories.

1907 - Henri Bergson said that the ultimate reality is a vital impulse comprehensible only by intuition. The brain screens out the larger reality.

1929 - Alfred Whitehead, mathematician and philosopher, described nature as a great expanding nexus of occurrences not terminating in sense perception. Dualism such as mind/matter are false; reality is inclusive and interlocking. . . and Karl Lashley published his great body of research demonstrating that specific memory is not to be found in any particular site in the brain but is distributed throughout.

1947 - Dennis Gabor employed Leibniz's calculus to describe a potential three-dimensional photography: holography.

1965 - Emmett Leith and Juris Upatnicks announced their successful construction of holograms with the newly invented laser beam.

1969 - Karl Pribram, who had worked with Lashley as a neurosurgeon, proposed that the hologram was a powerful model for brain processes.

1971 - Physicist David Bohm, who had worked with Einstein, proposed that the organization of the universe may be holographic.
1975 - Pribram synthesized his theories and Bohm's in a German publication on Gestalt psychology.

1977 - Pribram speculated on the unifying metaphysical implication of the synthesis.


11. Wilber, Ken. *Eye to Eye.* op. cit. pp. 169-170. The attack against moving from lower levels to higher levels continues:

"It's the reflex thing to do - finally, after decades of saying the physical universe is deterministic and therefore human choice is an illusion, you find a little indeterminacy in the physical realm and you go nuts. It's only natural you then try to explain human freedom and even God's freedom as a blowup of the lowest level. You get so excited you forget you have just pulled the reductionist feat of the century; God is that big electron in the sky. The intentions are so good, but the philosophy is so detrimental."

It is interesting to note Laura Nader's anthropological work in which she condones studying up in "Up the Anthropologist." Her contention is that we need to study the upper echelons of society, not only the lower, in order to grasp a fuller conception of culture.

13. Ibid. p. 185.

14. The use of the intransitive verb, cascade, in this sentence is particularly important. As a verb its meaning supposes a movement from levels to levels in continuous rhythms. As a deverbative, the noun cascade has a special meaning in physics and in electricity. The following definitions are from The American Heritage Dictionary which should help to clarify the full import of my usage of cascade as the noun becomes the verb in my sentence.

Physics: An analogous structure or phenomenon, as:

a. A cosmic-ray shower generated by the successive alternate production of electron pairs by pair production and of photons by bremsstrahlung [electromagnetic radiation], continuing until the energy of each single particle is below the threshold for pair production.

b. A process occurring in an electrical discharge in a gas by which at least one member of an ion pair is accelerated by the field to sufficiently high energy to produce another pair of ions in collision.

Electricity: A series of components or networks, the output of each of which serves as the input for the next.

15. The holomovement may also be described by algebraic mathematization, since the algebraic symbols can describe movement.

\[ A_j A_j = \sum \lambda_j^k \sum A_k \]

"... in the algebraic mathematization of this general language, we
consider as a totality an undefinable algebra in which the primary
meaning of each term is that it signifies a 'whole movement' in
all the terms of the algebra. Through this key similarity there
arises the possibility of a coherent mathematization of the sort of
general description that takes the totality to be the undefinable
and immeasurable holomovement." See Bohm, David.op. cit. p. 164
"Algebra and the Holomovement."

18. Ibid. p. 199.
and Vakar, Gertrude (eds. and trans.) Cambridge, Mass.: The M.I.T.
21. Leont'ev, Aleksei Nikolaevich. Activity, Consciousness, and
p. 67.
22. Ibid. p. 67.
1959. p. 194.
25. Ibid., p. 196.


27. Ibid., p. 69-70.

28. Ibid., pp. 72-73.


30. Ibid., p. 115.

31. "Fluxion" is defined as continual change; this is the most apt description of dialectic dialogue. In scientific terminology, the processual aspect of flux refers to changes in regard to abstract influences persisting in time; it actively induces as well as participates in brazing or soldering the parts that are to be joined.

32. Vygotsky, Lev. op. cit., p. 144.


35. Ibid., pp. 13-14.

37. "Contrapuntal" is a musical term which delineates counterpoint notation. In contrapuntal writing (of music) a melody is added above or below an existing melody; also, it is the combination of two or more melodies such that harmonic relationships are established while retaining their individuality. In my rendition of movement between thought and word, I hear inner speech as the counterpoint of the melody of thought and the melody of words, both of which are individual entities, but which combine in the intrapsychological activity of the movement of inner speech.


39. Ibid. p. 15.


42. Ibid., p. xvi.

43. An endpoint in a written product occurs when the writer decides to culminate the activity—for the time being. I personally doubt that a language process can strictly be said to terminate, for a respondent in the guise of a reader, for instance, carries on the activity, in a qualitatively different manner, however. Appendix B is a personal letter to a friend in which I attempted
to trace my writing activity, a necessary adjunct to writing about writing.

44. Mandelstam, Osip. in France, Peter. Poets of Modern Russia.
Chapter Three
Irreversibility: The Torrent of Ferment

Figure 22. Irreversible/Open – Reversible/Closed.
Irreversibility procreates turbulence — a raging, overwhelming flow toward higher states of disorder; this is the torrent of continuing pulses and impulses agitating, inexorably, toward the stirrings of stability, but all the while, the activity of disorder to order seethes into yet further chaotic dynamics through an expanding continuum. This fermenting of disorder into order into disorder realizes its jargon of randomness in the implicate order whereby dialogue with the environment internalizes itself into monologue which unfolds into a more elegant dialogue with oneself. The elegant dialogue is the realization of one's own thought, being aware of the awareness, the chaos that spurs feedback-free interrelationships with nature, and by extension, with language activity.

Fomenting a feedback-free system is irreversibility, that which is far from equilibrium, is open, and is self-organizing.

To contemplate an irreversible "chaotic dynamic," think about sitting at the edge of a lake, watching the whirls and eddies of the water flowing toward you. Then, in an undescribed, unpredictable moment, the water splashes up in the midst of the regular pattern of the water flow. Upon analysis you see that no outside force disrupted the water, the rocks and crags are in the same configurations, all is as it was; so, how did it happen that the splash erupted?

The splash is random, built into the irreversible patterns of the water flow. That random occurrence then enfolds back into the pattern of the water flow while that randomness aggravated the system such that the pattern changed but continued and became a new order, qualitatively
different from the previous pattern as it unfolds into another stirring of stability, only to be disordered again and again, in an irreversible manner, to higher states of disorder.

Randomness, or chaos, is not built into closed systems whereby time is reversible.

In a closed system there are clearly defined exchanges... Nothing new enters or leaves a closed system. The system has clearly defined parts.

For maximum efficiency these parts must keep to a fixed regime. They can only operate within very narrow ranges. A part can be replaced, of course, but the system itself doesn't make such repairs... Thus closed systems always involve equilibrium or near-equilibrium situations.4

When a system reaches equilibrium, it is stable and movement ends. The system runs down, but being composed of parts, the parts may be replaced, only to stabilize and close. In this way the system is reversible and does not establish higher orders and more complexity; it degenerates and is, hence, counter-evolutionary. Past and future appear synonomous.

In the evolutionary paradigm, however, systems become progressively complex; the past has a distinctiveness that is factored into an increasingly multidimensional future which is qualitatively different from the past. The parts of today cannot be put back together to form the same parts of tomorrow. In an open, evolutionary system, equilibrium is not reached. As in the chaotic dynamics of a water splash, the system could not repeat itself into the same splash. The splash that occurred is irreversible, evolved from patterns on the lake, and is marked as the past. Although the lake is the same and is equilibrated
as a body of water, the next splash will be random in the far from equilibrium environment of the lake as a whole.

'Open systems' ... emerge and actually thrive in a volatile arena far from equilibrium. Open systems are able to adjust to outside changes ... Prigogine realized that a major factor distinguishing living, open systems from closed systems such as machines is the far-from-equilibrium environment -- an environment of high energy and the influx of new chemicals. It is an environment which is 'chaotic' in a different way ... In this environment, living systems appear and evolve.5

The difference between past and future, and therefore, irreversibility, is procreated by the turbulence of randomness in far-from-equilibrium, open systems. The disorderly outgrowths of chaos veer toward order, fluctuate, and become disordered again as the flow and flux of evolution strive onward.

... we see everywhere the role of irreversible processes, of fluctuations. The models considered by classical physics seem to us to occur only in limiting situations such as we can create artificially by putting matter into a box and then waiting till it reaches equilibrium. The artificial may be deterministic and reversible. The natural contains essential elements of randomness and irreversibility. This leads to a new view of matter in which matter is no longer the passive substance described in the mechanistic world view but is associated with spontaneous activity. This change is so profound that... we can really speak about a new dialogue of man with nature.6

What seems certain is that these far-from-equilibrium phenomena illustrate an essential and unexpected property of matter: physics may henceforth describe structures as adapted to outside conditions. We meet in rather simple chemical systems a kind of prebiological adaptation mechanism. To use somewhat anthropomorphic
language: in equilibrium matter is 'blind,' but in far-from-equilibrium conditions it begins to be able to perceive, to 'take into account,' in its ways of functioning, differences in the external world. (Emphasis mine.)

In this far-from-equilibrium environment in which matter is not passive, is subject to spontaneous activity, and is adapted to outside properties, the point of view opposes the regular conditions in physics, the delineated equations in chemistry, and the always-relied-upon genetic code in biology. The "prebiological adaptation mechanism" takes into account the external, explicate world, in which the mechanism itself then enfolds and unfolds evolutionarily as moments pass irreversibly. The mechanism is a fluctuation in the system: a small or minor random element embedded in the external system impinges upon, and infiltrates the system within the system, and the result is the variation circumscribing yet larger and larger wholes. From this perspective, in a far from equilibrium, irreversible system, a random "splash" in the environment may be said to be the precursor a newly evolved form in the explicate order.

A small fluctuation may start an entirely new evolution that will drastically change the whole behavior of the macroscopic system. The analogy with social phenomena, even with history, is inescapable. Far from opposing 'chance' and 'necessity,' we now see both aspects as essential in the description of nonlinear systems far from equilibrium.

The fermenting of the disorderly randomness is in the implicate order whereby dialogue with nature is internalized by open, self-organizing systems. The contention here is that the zoon phonata, the
animal who speaks, was a random splash in evolution ensconced by a prebiological adaptation mechanism in which chance and necessity were essential in the evolving of the nonlinear system of language activity far from equilibrium in nonlocal planes. The random, small fluctuation adapted to outside conditions and promulgated a new evolution on an irreversible track. The dialogue continues and grows increasingly complex. "We believe that the experimental dialogue is an irreversible acquisition of human culture." \(^9\)

To address this contention the argument between sociobiologists and cultural anthropologists comes to the fore. The genetic system is feedback dominated, growing within its own system as a hierarchy. (See Figure 23.) Because of the feedback, the system perpetuates itself, but does not evolve. Feedback allows linearity. If, however, the system is feedback-free on a macroscopic level, while providing feedback loops on the microscopic level, the system evolves into higher complexities as a direct result of fluctuations in the external whole as the fluctuations or "built-in randomness" is implicated from outside conditions. Feedback-free systems cannot be taken apart, as in Figure 20 in which the A, B, or C may be examined as distinct microscopic parts. Feedback-free is nonlinear, nonhierarchial, such that the increasing complexity derives from the randomness, and the randomness changes the current pattern into a qualitatively different pattern as it evolves. Since the pattern builds and is adapted from outside conditions, it is irreversible, and the past and future are not synonymous as in a reversible, closed system which is dissectable.
Figure 23. Feedback Dominated System.
The irreversible system is the raging, overwhelming flow toward higher states of disorder, the torrent with random fluctuations toward the stirrings of stability which expands into more highly evolved systems.

Hence, the argument: in the beginning was the gene vs. in the beginning was random fluctuations built into outside conditions, a culture that is disorderly as it almost reaches stability, but then "splashes" and becomes disorderly again as complexity increases.

Sociobiology vs. cultural anthropology, in light of language activity.

Sociobiology: "Sociobiology is defined as the systematic study of the biological basis of all social behavior." Our biology is somehow more real... forcefully manipulating our behavior. Culture is thin veneer.

Cultural anthropology: "Contrary to Wilson, I would place all the sciences relating to humans within an anthropological framework - where, surely, they naturally belong - and make sociobiology an intrinsic part of that framework." "It is very likely true that whatever is universal in humans is biologically significant, in the sense of contributing to the perpetuation of the species, but it does not follow that any of these qualities must be determined genetically."

The "hallowness of the sociobiology debate" is simply "rival fatalisms." The development of the nonhierarchial language system, as it irreversibly evolves, must take into account open and closed systems vis-à-vis traditions. Language origin is exogenetic, i.e., feedback-free, whereby dialogue with the environment internalizes
itself into monologue which unfolds into the dialogue with oneself, the realization of one's own thought; that is the chaos that spurs feedback-free interrelationships with nature in which language becomes.

Throughout the animal kingdom there are abundant examples of the manner in which information totally determines an animal's every tactical location of existence, from its inception to its demise. For the human group, sociobiologist Edmund O. Wilson uses the example of right- or left-handedness as genetically determined, but handedness can be changed by social custom. Even Wilson backs down somewhat when he states that "The genes have their way unless specifically contravened by conscious choice." Yet, Derek Freeman, an anthropologist, raises the distinction that the action of the human is not determined by the genes for right- or left-handedness, but by what is preferred by the culture. Freeman terms this an "alternative."

What it also plainly demonstrates is that among humans the actions of individuals may be determined not by the relevant pre-existing genetic program, but instead, by an alternative which, in the course of the history of the population concerned, has come to be culturally preferred and socially sanctioned... The alternative action is a direct expression of a highly developed capacity to make choices which, when it is viewed in evolutionary perspective, is seen to be one of the defining characteristics of the human ethogram. (Emphasis mine.)

Being able to choose an alternative depends upon the outside conditions of the explicate order; the alternative, then, is manifest as a random element which is subsequently internalized in the implicate order, such that there is a disorder at first that self organizes in
the system as an order and is integrated into the pattern as a cultural preference. The alternative is feedback-free as it does not turn upon itself, but rather changes the system, irreversibly, and is incorporated into the expanding continuum of complexity. In a feedback dominated system, genes would "decide" the course of an action, and do so on the microscopic level, such that the feedback loops of the system retain a closed program reaching equilibrium. The alternative in an open program, in contrast, dependent upon far from equilibrium outside conditions, does not regenerate itself, as the genes do, but evolves into qualitatively different patterns at the same time as it changes the pattern, from disorder into order into further disorder.

In referring to Figure 12, Chapter Two, it was demonstrated that information enters the sense organs and then travels through and about the nervous system to the brain, holographically, from the outside. This does not occur in a genetic or closed program of behavior. E. Mayr encapsulates the difference.

The young in some species appear to be born with a genetic program containing an almost complete set of ready-made, predictable responses to the stimuli of the environment. We say of such an organism that its behavior program is closed. The other extreme is provided by organisms that have a great capacity to benefit from experience, to learn how to react to the environment, to continue adding 'information' to their behavior program, which consequently is an open program.18

Information is the exchange of energy and matter in the flux of the holomovement and makes up the dialogue with nature as a human
experiences the flux in her patterns. The continuation of the dialogue is possible in an open program not dependent upon genetic feedback.

... openness with respect to the exchange of energy and matter with the environment [proceeds in] far from equilibrium conditions. The result is a type of behavior which is called non-linear and which is characterized by runaway processes.19

Hence, closed programs, genetically determined, allow no input through the outside conditions manifested in experience, whereas an open program does allow input through experience in which experience is active participation with the environment, dialoguing with nature which leads to an accumulation of information built upon alternatives involving chance and necessity in nonlinear systems far from equilibrium.

Language evolved in the humans' open program since they benefitted from random experiences, incorporated the alternatives from the outside conditions into more complex patterns, and then continued adding information to the constantly changing patterns.

The primary question becomes: how did the humans' open program come about such that language activity became a random splash that forged newer patterns in the dialogue with nature? Mayr contends that a larger central nervous system, in the human the cerebral cortex, is necessary. More information requires more storage capacity. A closed genetic program would not have this requirement. Mark Weiss and Alan Mann and Clifford Geertz,20 anthropologists, contend that an elementary form of culture began over two million years before the appearance of Homo sapiens. What this means is that the human cerebral cortex continued to enlarge after the emergence of culture. The biological
evolution of the larger cerebral cortex, the "tumerous outgrowth," (Koestler) continued after cultural development began.

Furthermore, an open program in which the individual benefits from random experiences, incorporates alternatives from outside conditions, and continues to add information would be characterized by feedback-free interrelationships with another part of nature, that being other individuals. In a rudimentary, but also complex, interrelationship humans provide extensive parental care of their young. "When the young of a species grow up under the guidance of their parents they have a long period of opportunity to learn from them useful information on enemies, food, shelter, and other important components of their immediate environment."²¹

As this useful information gets handed down from parents to offspring, and those offspring hand down to their offspring, and so on, the information is not dependent upon the feedback, closed, genetic program. Rather, the information evolves through the open program. The open program, in this sense, evolves by means of natural selection.²² Natural selection, in the simplest explanation, is that the fittest of the descendants develop an advantage over others in fertility and viability. This means that some types are "selected" by the environment because they leave more descendants than do other types. In an open program it is the information that proves to be the most successful that is handed down to the next generation.

However, the influx and further fluxion of information from outside conditions is disorderly and is everywhere as everything affects
everything else in a far from equilibrium environment. Entropy is increasing disorder, but according to classical physics, the law of increasing entropy is the "running down" of the universe. Prigogine's argument, though, is that a system begins in one state and ends up in a different state, irreversibly, because of the large increase in entropy. The different state does not "come back around" to the initial state.

The ideal reversible processes are totally gentle, free from shocks, sudden movement, friction, and violent flows of energy. Irreversible processes are just the opposite. Their sudden changes, shocks, turbulence, and explosiveness act to disturb the correlations between each elementary part of the system. Irreversible processes are therefore always accompanied by an increasing disorder and this is exactly what scientists mean by entropy. As the correlations and order of a system are broken down the system's entropy or disorder increases and energy that is available for useful work diminishes. So irreversible systems are humpty-dumpty creatures. They move in a particular direction and thermodynamically can't be put back together again. They can't be put back because of the law of increasing entropy. Reversible systems are idealized, but in reality irreversible ones are the rule and increasing entropy is everywhere. The fact of entropy increase gives a direction to time... Time has a one-way arrow, and thermodynamics shows us how to tell its direction. The arrow of time points toward an increase in entropy.23

In other words, the evolutionary paradigm of the natural selection of information is the result of the growth of entropy.

Order and disorder are complicated notions: the units involved in the static description of dynamics are not the same as those that have to be introduced to achieve the evolutionary paradigm as expressed by the growth of entropy. This transition leads to a new concept of
matter, matter that is 'active,' as matter leads to irreversible processes and as irreversible processes organize matter.24

Furthermore, the process becomes not only evolutionary, but also revolutionary, as each selection of information is implicated irreversibly as the complex emerges from the simple. Alvin Toffler states the position:

By offering rigorous ways of modeling qualitative change, for example, they [Prigogine and Stengers] shed light on the concept of revolution. By explaining how successive instabilities give rise to transformatory change, they illuminate organization theory. They throw a fresh light, as well, on certain psychological processes -- innovation, for example, which the authors see as associated with 'nonaverage' behavior of the kind that arises under nonequilibrium conditions. Even more significant, perhaps, are the implications for the study of collective behavior. Prigogine and Stengers caution against leaping to genetic or sociobiological explanations for puzzling social behavior. Many things that are attributed to biological pre-wiring are not produced by selfish, determinist genes, but rather by social interactions under nonequilibrium conditions.25

In effect, in an open program whereby information that proves to be the most successful is the information that is handed down to the next generation is the information that is selected. In Prigoginian terms, entropy is a selection principal: order out of chaos. The disorderly, random splashes of information become alternatives which come to be preferred by the culture dependent upon the choices made from among the flux of choices unfolded in the holomovement of outside conditions. The choice, or small fluctuation in the pattern, starts a new evolutionary
pattern that decidedly changes the whole behavioral pattern of a system. The splash that occurs in an undescribed, unpredictable moment in the midst of the regular pattern and is selected as an alternative from the surrounding information then stabilizes as an order. This order may become a tradition until the next splash occurs and revolutionizes the pattern.

There is now ... conclusive evidence to show that an open program, itself the product of natural selection, can, in some species, lead to the formation of what are called traditions; and when this happens we are dealing with the initial stage of a mode of transmitting information from generation to generation within populations that is no longer directly dependent (as are closed programs of behavior) on the operation of a genetic code.26

This discussion points to, but does not define, a hunch about the origin of language. The origin of language would be undefinable simply because it evolved from active states of matter in the explicate order and the impossibility of pinpointing the random splash that changed the pattern into further disorder and evolved into an order.27 The surmise is that language came to be expressed because of the growth of entropy causing transformatory changes within far from equilibrium systems of collective behavior. Language is an order, constantly apprehending, enfolding, increases in entropy in the chaotic dynamics of a feedback-free implicate order whereby it evolves and revolutionizes disorder manifest in the form of consciousness which unfolds in an ordered pattern.

Vygotsky's quote in Chapter Two, page 49, takes on added significance in view of the chaotic dynamics of collective behavior.
In order to explain the highly complex forms of human consciousness one must go beyond the human organism. One must seek the origins of conscious activity and 'categorical' behavior not in the recesses of the human brain or in the depths of the spirit, but in the external conditions of life. Above all, this means that one must seek these origins in the external processes of social life, in the social and historical forms of human existence.  

The more elegant dialogue is the realization of one's own thought, being aware of the awareness, the chaos that spurs feedback-free interrelationships in language activity; that dialogue is made up of words, not merely the words, though, but their meanings and senses. The crux is that meanings and senses self-organize as they irreversibly evolve into more complexity as they strive symbiotically toward equilibrium only to become chaotic again, nonequilibrated, as every new situation presents itself.  

The relationships between the human and the external world are not only enveloped in sensory experiences, but also in conscious abstractions of the experiences and the relationships between sensory and abstracted experiences. Alexandre Luria states that "the inner life of humans... and the reflection in this inner life of the external world" is consciousness and is made possible through the "active interaction between humans and external reality." Language is connected to this active interaction between humans, while at the same time, language can be and is separate from active, practical interactions by a system of codes. A. N. Leont'ev notes that  

This position, however, can by no means be interpreted as meaning that consciousness has
its origin in language. Language is not its demiurge, but a form of its existence. Moreover, words, the language signs, are not simply replacements for things, their conditional substitutes. Behind philological meanings is hidden social practice, activity transformed and crystallized in them; only in the process of this activity is objective reality revealed to man.32

Thus, language is a system of codes which designates the objects of the external conditions and the relationships of these objects in practical and abstract categories.

Through the system of codes the human's experience, evolving from generation to generation, has a basic element which continues, renews, and changes the transmission of the experiences. This basic element, according to Luria, is the word. "A word can be used to refer to objects and to identify properties, actions, and relationships. Words organize things into systems. That is to say, words codify our experience."33

When the child begins to interact with adults, outside conditions themselves, he indicates and specifies objects. His initial utterances are directed toward objects, and the designations are a part of his active participation with active states of matter. In the deep elasticity of his reality, the profoundly social milieu, the child begins to learn words.

The first words arise not from the child's babbling sounds, but from the linguistic sounds the child learns by perceiving the speech of older people. Children's language is always initially connected with their
actions and with their interaction with adults. In contrast to babbling, children's first words do not express a state, but are directed toward and designate an object.34

Luria also distinguishes between the "sympractical" characteristic and the "synsemantic" system of words. The former allows words to acquire meaning only with the action or the activity associated with it. The meaning develops from the practical situation in which the word is concretely linked to the action. In the latter system the word is able to be separated from its context, to be able to be used abstractly. Hence, when a child uses a word in reference to his action, the action is intertwined with a concrete, specific, external situation; this is the sympractical character of a word. Only as time passes irreversibly, after many social interactions, does the child extricate the word from the situational context, and the word becomes synsemantic.35, 36

Although words are initially used in a particular situation, they are not merely labels. One word may possess numerous meanings, "polysemy," but as the child associates her word with various outside conditions, she begins to abstract the label from the situation. In doing so, there is no longer a label but a "semantic field" around the word which comes about because of more and more social interactions, feedback-free interrelationships, in which the child may use the word.

A word conjures up a different meaning in every context in which it is used. A word never has exactly the same meaning from situation to
situation, as the outside conditions are in constant flux, since the associations and relations vary within, through, about, around each situation. So, the semantic field around a word contains as many senses, symbiotically with the meanings, as there are situations. The child chooses the meaning for her word from the semantic field of the word which is closest to her personal meaning in the situation in which she finds herself. The meaning of a word, therefore, is being defined and redefined continuously, is self-organizing, by the child in her interactions with the flow of outside conditions that are implicated into the whole.

Vygotsky writes that as the child develops more and more consciousness of the world around him, he develops word meanings. Meaning, as defined by Luria, is the semantic relationships of a word that come about because of a human's social history; and, this history evolves irreversibly. Meaning becomes stable in a categorical way but retains flexibility. Sense, on the other hand, is an instance of the particular situation in which the word is used. Every situation employs a somewhat stable (a stirring of stability) meaning of a word in the sense of the individual situation. By continuously redefining words in varied situations, the child actually changes word meanings, and his consciousness also changes as his personal sense of a word symbiotically evolves with the meanings.

From Mikhail Mikhailovich Bakhtin:

As a living, socio-ideological concrete thing, ... language, for the individual consciousness, lies
on the borderline between oneself and the other. The word in language is half someone else's. It becomes 'one's own' only when the speaker populates it with his own intention, his own accent, when he appropriates the word, adapting it to his own semantic and expressive intention. Prior to this moment of appropriation, the word does not exist in a neutral and impersonal language (it is not, after all, out of a dictionary that the speaker gets his words!), but rather it exists in other people's mouths, in other people's contexts, serving other people's intentions: it is from there that one must take the word, and make it one's own. And not all words for just anyone submit equally easily to this appropriation, to this seizure and transformation into private property: many words stubbornly resist, others remain alien, sound foreign in the mouth of the one who appropriated them and who now speaks them; they cannot be assimilated into his context and fall out of it; it is as if they put themselves in quotation marks against the will of the speaker. Language is not a neutral medium that passes freely and easily into the private property of the speaker's intentions; it is populated - overpopulated - with the intentions of others. Expropriating it, forcing it to submit to one's own intentions and accents, is a difficult and complicated process. (Emphasis mine.)

... The semantic structure of an internally persuasive discourse is not finite, it is open; in each of the new contexts that dialogize it, this discourse is able to reveal ever newer ways to mean.

T. V. Akhutina describes the process of the meanings of words as deriving from motive to thought to inner speech to semantic plane to external speech in which the sense of a word is embedded in the person's motive and through the mediation of the thought, inner speech, and
Figure 24. Akhutina's Motive to External Speech.
semantic plane becomes meaning in external speech. Her schematic of this process is Figure 24. According to this formulation, an individual's external activity affects her and, in turn, delineates an internal situation, the motive. This motive, in Vygotsky's terms, represents a need to resolve a conflict. The conflict is resolved through the mediation of thought which creates inner speech and becomes embodied in words. Words unfold, thereafter, in the external speech of the individual.

Since the internal situation absorbs the whole individual, it is always totally unique and subjectively concrete; and since this concreteness is unbounded, the situation always has some degree of indeterminacy about it... Thus, the linguistic meaning selected to fix the thought absorbs the situation and becomes a situational meaning, i.e., sense. In this way meaning comes to convey a content that goes far beyond its limits. This new conflict, which is now verbal, is resolved as speech unfolds.40

In Akhutina's schematic representation, external activity causes an internal situation, i.e., the sense, which eventually causes a new external situation, i.e., the meaning. The conjecture here, however, is that external conditions cause external meanings: meanings which remain open to fluctuations are meanings chosen from among the fluctuations in a chaotic web of numerous meanings which are then internalized into the individual's sense which then mediates a meaning which is new. The point is a subtle one, but is directed toward a self-organizing system. (See Figure 25.) In a self-organizing framework, though, a meaning is established in a far from equilibrium environment among many meanings. Only until a meaning is externally "balanced" in the
Figure 25. External Activity to External Speech.
outside conditions may it stabilize and then be internalized into an individual's sense.

Jantsch says self-organizing, autopoietic, structures keep the shape of their processes by constantly balancing the need to remain safe from fluctuation with the need to remain open to it... the brain [is] more open to fluctuation. [It] also [tries] to maintain a dynamic balance, but the brain is inherently more unstable. In the human brain, for example, thoughts bounce around and can produce great fluctuation... before they're rejected. Some radically new thought may not be rejected at all but may generate so much fluctuation that it will transform the brain with a new insight or new sense of self.

... the brain which allows this remarkable autonomy is more open to fluctuation and therefore more unstable, unpredictable ... Openness to fluctuation also means a greater, closer, more intimate connection with the flux and flow of the environment.

In a self-organizing system, therefore, outside conditions would cause external activity which causes numerous fluctuations still in the outside conditions which allow choices within the fluctuations; and, a choice made would be random or chaotic as a balance is sought, that balance being an external meaning chosen from among many, and that meaning is then internalized, becomes sense, and evolves to a new meaning externally explicated by an individual. This subtle conjecture takes the manifest appearance in Figure 26.

In language activity it is the word that emancipates and partakes in dialogue, the outside conditions of a far from equilibrium environment in which humans are themselves an outside condition. The meanings and senses of words, a chaotic dynamic of feedback-free
interrelationships, are the evolutionary growth toward further dialogue. As new meanings in new outside conditions cause yet more fluctuations into more new outside conditions, the individual realizes her own thought, becomes aware of the awareness of her own sense, in a disorderly, irreversible torrent that continues, anew, the ferment of the elegant dialogue with nature and with oneself.

(Splash.)
Evolving in same manner, but is qualitatively different from previous meaning and conditions causing a choice made randomly internalized as Motive

Thought

Inner Speech

Semantic Plane

External Speech

becomes New Meaning in New Outside Conditions

which causes further fluctuations

Figure 26. Outside Conditions to More New Outside Conditions.
NOTES

1. Throughout this chapter and those to follow the words such as "flow," "dialectic," "movement," "enfold," "unfold," "activity," are used as they have been implicated in Chapter Two. Chapter Three builds progressively from this special terminology as it penetrates new terminology, e.g., "irreversibility," while shaping itself into an emerging whole.

2. "Chaotic dynamics" is another term for the study of order out of chaos. Rob Shaw, a theoretical physicist at University of California at Santa Cruz, joined with Doyne Farmer (astrophysicist), Norman Pachard (statistical mechanical engineer), and Ralph Abraham (mathematician) to form what they call their "Dynamical Systems Collective" or, in the colloquial, the "chaos cabal." New members include Otto Roessler (German theoretical chemist and founder of the Roessler attractor), Jim Yorke (equation wizard at University of Maryland), and Edward Lorenz (M.I.T. meteorologist). A few others are David Ruelle (mathematical physicist at the Institute of Advanced Scientific Studies, Paris) and Floris Takens (mathematician at State University of Groningen, Holland). There is also Arnold Mandell (psychiatrist at University of California at San Diego). An overview of the work of the chaos cabal is found in "Connoisseurs of Chaos," Omni, June, 1983, by Judith Hooper. Hooper feels that the interdisciplinary status of the group forces them to speak of
chaotic dynamics in terms of poetry and philosophy. A quote from the psychiatrist brings us from physics to humans.

"The same principle applies to humans, Mandell thinks. If you went out for a random walk everyday, certain patterns, essentially your individual signature, would emerge. 'And how is it that your thoughts are in flux from moment to moment, yet have an overall stability?' he asks. 'Despite the ever-changing stream of consciousness, you remain the same person with the same mind. The concept of deterministic chaos can resolve that paradox.' These days Mandell wears his world view on a T-shirt: BOUNDED CHAOTIC MIXING PRODUCES STRANGE STABILITY."

3. Many sources use the example of a waterfall producing a splash or a standard faucet to explain a chaotic dynamic. See Briggs and Peat, op.cit. "'The fascinating thing about a standard faucet, he explains, 'is that even though the [water] flow is constant, the spigot doesn't move, and nothing perturbs the system, the pattern never repeats itself. It's got a random element in it.'"


5. Ibid., p. 163.

9. Ibid., p. 44.
15. An example of handedness being changed can be observed in Arabic countries, as I noted while living in Morocco. Children are slapped forcefully when the left hand is used for eating; only the right hand is acceptable, since the sole purpose of using the left hand is for ablution either in cleansing the body or for latrinalia purposes. There are distinct religious connotations to the ritual, and no child grows up as a "south paw."


23. Briggs, John and Peat, David. op. cit. p. 156-7. The mathematical expression of entropy is as follows: "Entropy is the measure of the capacity of a system to undergo spontaneous change, thermodynamically specified by the relationship \( ds = d Q/T \) where \( ds \) is an infinitesimal change in the measure for a system absorbing an infinitesimal quantity of heat \( dQ \) at absolute temperature \( T \). Entropy is the measure of the randomness, disorder, or chaos in a system specified in statistical mechanics by the relationship \( S = k \ln P + c \), where \( S \) is the value of the measure for a system in a given state, \( P \) is the
probability of occurrence of that state, and $k$ is a fixed and $c$ an arbitrary constant." This is the textbook explanation as stated in the American Heritage Dictionary. See "Book Two: The Science of Complexity" in Prigogine and Stengers. op. cit. for a complete explanation, pp. 103-209.


27. The origin of language is beyond the scope of this dissertation. However, the origin of life, in view of self organization, is being traced; this quote is from Prigogine and Stengers, op. cit., p. 176.

"It is a remarkable fact that recently discovered fossil forms of life appear nearly simultaneously with the first rock formations (the oldest micro-fossils known today date back $3.8 \times 10^9$ years, while the age of the earth is supposed to be $4.6 \times 10^9$ years; the formation of the first rocks is also dated back to $3.8 \times 10^9$ years). The early appearance of life is certainly an argument in favor of the idea that life is the result of spontaneous self-organization that occurs whenever conditions for it permit."


29. "Symbiotically" modifies the relationship between meaning and sense in the biological aspect of the word. In a symbiotic relationship two different entities have a close association that may or may not be of benefit to each. This seems particularly true of the "stable" meaning of a word which is enhanced by an individual's sense of the
word in one situation, whereas in another situation, the sense of the word may contradict the meaning.

30. "Reflection" is used here as it was described in Chapter Two.


33. Luria, Alexandre. op. cit., p. 31.

34. Ibid., p. 33.


36. From Luria, A. op. cit., p. 32:

"Apparently, the entire history of human language is the history of the emancipation of the word from practical life and the evolution of speech as an independent activity. This activity makes use of language and its elements (i.e., words) in an independent system of codes. The process of emancipating the word from its sympirical context involves the transition of language to a synsemantic system. As we shall see later, the most developed form of this independent synsemantic code is seen in written language."

This issue of written language will be discussed in Chapter Four as the dissipative structures of a self-organizing system allow the activity of writing becoming.
37. Bakhtin, M. M. *The Dialogic Imagination*. Holquist, Michael (ed.)
and Emerson, Caryl and Holquist, Michal (trans.). Austin: Univ. of

38. Ibid., p. 346.


40. Ibid., p. 19.

Chapter Four

Dissipative Structures: The Higher Order Mavericks

It is raining. The drops pounce on the window pane as they pour downward in random rivulets, some driving to the edge, some filtering to the side, some bouncing off, and some, following their own direction, merge into other drops. Specks of drops form into a larger drop, cohere, and fall downward as the weight of the larger drop propels it to the bottom of the pane. All the while, however, larger drops, as they fall downward, also merge with smaller and other larger drops, introducing a distinct directedness to the flow of the merged drops until a puddle emerges on the sill of the window pane. And, the rain continues.

This example of raindrops illustrates a "higher level of order" being reached as raindrops self organize into a particular pattern. The raindrops zigzag downward with their own rhythm and newly established path; this is the micro-system of the pattern. The pattern moves downward, also, because of a macro-system, i.e., the force of gravity, the larger system through which the zigzag pattern dynamically operates. When the raindrops form a pattern within their micro-system within the macro-system, the pattern becomes a higher level order, or in Prigoginian terms, a dissipative structure.

... all systems contain subsystems, which are continually 'fluctuating.' At times, a single
fluctuation or a combination of them may become so powerful... that it shatters the preexisting organization. At this revolutionary moment -- a 'singular moment' or a 'bifurcation point' -- it is inherently impossible to determine in advance which direction change will take: whether the system will disintegrate into 'chaos' or leap to a new, more differentiated, higher level of 'order' or organization, a 'dissipative structure.'

The most famous example of a dissipative structure is the Belousov-Zhabotinskii reaction. In 1958 these Soviet researchers discovered that a chemical reaction can and does take place in a far from equilibrium environment. This is not a "regular" chemical reaction because it generates a structure and maintains the flow of its structure, while at the same time, becomes increasingly complex. In a regular chemical reaction two reagents experience "molecular collisions" until a bond between the reagents is formed, and the bond produces a new molecule. Quantum mechanical laws follow this path such that after all of the molecules of the two reagents are bonded, a product is produced, and the chemical reaction ends, there is no further growth, the flow stops.

In the positivistic realm all chemical, or inanimate, reactions are considered to follow this path of the quantum mechanical law. The intriguing (and mystifying, to "regular" scientists) aspect of the Belousov-Zhabotinskii reaction is that it does not follow the mechanical law. In this reaction the reagents evolve in a far from equilibrium environment and continuously produce concentric, or "rotating spiral waves," that pulse into "interference patterns," which produce more and more patterns. There are "periodical bursts" of activity, fluctuations,
which continue the reaction. The chemical reaction does not end, there is further growth, the flow does not stop.

... the Belousov-Zhabotinsky reaction created a structure of concentric and spiral 'cells' that pulsed and remained stable even as the reaction secreted more cells. The reaction is clearly chemical and does not involve DNA, but in its structure it looks like the growth of a life form! The discovery of far-from-equilibrium structures appearing in chemical reactions offered new insights into the dynamics of these spontaneous forms. They are quite different from 'regular' reactions.

The "periodical bursts" of activity, furthermore, show within the reaction "certain preferences of spatial directions" within the reactions of the reaction. In other words, the reaction is irreversible; the oscillations continue such that time cannot be reversed. "Such a behaviour is called chaotic and the phenomenon is known as chaos. There must be at least one unstable equilibrium and a bounding surface for global stability. The oscillatory pattern is never exactly repeated."

In a dissipative structure, entropy is constantly produced. Entropy does not have a cumulative effect within the system, but continuously affects the system as energy is exchanged with the outside conditions, the environment. Jantsch terms this exchange "coherent behaviour."

When a system reaches equilibrium, the system dies. When a system is far from equilibrium, an order emerges and achieves coherent behavior.

It is not the statistical measure of the entropy share in the total energy of the system at a given moment that characterizes a dissipative structure, but the dynamic measure of the rate of entropy production and of the exchange with the
environment -- in other words, the intensity of energy penetration and conversion.

With the help of this energy and matter exchange with the environment, the system maintains its inner non-equilibrium, and the non-equilibrium, in turn, maintains the exchange processes. . . A dissipative structure continuously renews itself and maintains a particular dynamic regime, a globally stable space-time structure. It seems to be interested solely in its own integrity and self-renewal.

The actually unfolding process chains and the resulting process webs are unpredictable, but they obey certain rules. These rules are based on a single fundamental principle, self-consistency. Whatever comes into being has to be consistent with itself and with everything else. A reduction of physical reality to basic building blocks or even to basic laws is not possible according to this concept which is in full development.7

A further consequence of dissipative self-organization is the interdependence of structure and function.8 As the emerging process interrelates to the function, the function interrelates to the structure, simultaneously. The exchange of energy, which is also the exchange of information from the outside conditions which is then internalized and subsequently transformed as it affects the new outside conditions,9 becomes extremely pliable in the simultaneity of interrelatedness of structure and function. In this way, self reference of a systemic view of the totality of the exchange unfolds and enfolds, albeit in unpredictable paths, but remains self consistent such that equilibrium is never fully achieved. A dissipative structure may form at an instability threshold, a bifurcation point, and transform the system into a
new regime, all the while the function of the self-organization of the system allows newer structures to form thereafter. Hence, the interdependence of structure and function allows "internal self-amplifications of fluctuations" which is the self-consistency of the micro-system as outside fluctuations spontaneously impinge upon the macro-system such that a more differentiated, higher level of order is achieved, a new dissipative structure which, in turn, promotes yet more dissipative structures; the totality of the exchange becomes the flow of coherent behavior.

Dissipative structures, thus, transcend the micro-system as they introduce a directedness to the system which ultimately changes the macro-system in which the directedness can be likened to a vector which changes and potentially predicts the direction of newer structures. As systems transcend subsystems that transcend systems, the dissipative structure seems a paradox. The macro-system remains open, is flowing, while the micro-system, as it changes, attempts stability to retain self-consistency. This attempt toward stability is also flowing, however, in the dialectical exchange between the systems. Briggs and Peat explain this paradox:

It [the dissipative structure] can survive only by remaining open to a flowing matter and energy exchange with the environment. In fact, matter and energy literally flow through it and form it. . . . On the other hand, this very openness somehow makes the structure resistant to change... This means the resistance to change must itself be a kind of flowing. The structure is stabilized by its flowing. It is stable but only relatively
stable—relative to the constant energy flow required to maintain its shape. Its very stability is also paradoxically an instability because of its total dependence on its environment. The dissipative structure is autonomous (separate) but only relatively separate. It is a flow within a flow. At its 'edges' is a constant exchange of one flow to another.11, 12

Dissipative structures become, as they are becoming, relatively autonomous subtotalities as they flow within the flow as subtotalities in nonlocal planes.

The process presents itself as random, but not random; as instable, but stable. In the nonlocal language planes of writing becoming, the process presents itself as themes, but also rhemes, or in terms of self-organization, as novelty, but also confirmation as it becomes an ordered regime. As a system which is irreversible and far from equilibrium, it is evolving, and in Jantsch's terms, it becomes "self-referential with respect to its own evolution." Dissipative structures, in the form of inner speech as the writer becomes aware of the awareness of the internal dialogue, gives direction to the transformatory changes taking place. The micro-system of the writer, then, manifests itself in various dissipative structures in a distinct direction which is no longer completely random, but follows an evolutionary path with respect to itself, i.e., self-referential, becoming coherent behavior in the macro-system. The stability of the total system accrues as the system experiences its own evolution. This is not to imply that the evolution is predetermined, but rather that the evolution is the concomitance of
the interaction of the system and the environment. At the same time, while stability accrues, new dissipative structures are forming, interjecting new instabilities which are either rejected or are taken over by the stability which is continuously accruing new information as it evolves self-referentially with respect to the total system. Jantsch repeats this process in relation to chemical systems, ecological systems, and cultural systems; and, in relation to the writer's system, the process is eminently feasible:

We may also say that knowledge is expressed by the system's finding of its own stability with respect to fluctuations and, further, that this knowledge is nothing else but the experience of the interaction between system and environment, cast into a specific reference frame.14

The unique aspect of the system's finding its own stability correlates with the "principle of maximum entropy production."15 There is an increase of entropy during an "instability phase" while new dissipative structures are forming. After a dissipative structure finds its direction and begins to stabilize, entropy minimizes. Entropy, or disorder, is minimized during a "stable phase," but in a far from equilibrium environment, the stable phase is over taken by more energy, or information, which is everywhere in the total system.

In other words, the system does not spare any expense for the creative build-up of a new structure -- and justifiably so as long as an inexhaustible reservoir of free energy is available in the environment. Only an established system, going for security, has to economize. This apparently does not only
hold for dissipative structures, but for all evolving systems.\textsuperscript{16}

The instability phase in a system represents novel information\textsuperscript{17} as the novelty self organizes into confirmation as the system stabilizes. Novelty, alone, is chaos; confirmation, alone, is equilibrium. Hence, it is the interaction of each which characterizes a system that becomes self-referential with respect to its own evolution. The writer's novel information is semantic in her inner speech which must be elaborated, or confirmed in syntactic forms as the information is written. The confirmed written form, in turn, creates more novelty in the writer's inner speech which further interacts with what is written and subsequently allows further novelty. According to Ernst von Weizsäcker,\textsuperscript{18} when information interacts and is exchanged in this manner, the system becomes less semantic and more pragmatic. "The semantics of semantics is pragmatic," such that the system becomes coherent and effective. Total instability is not effective, whereas total stability marks an end point in writing.

Weizsäcker's diagram clarifies this exchange. (See Figure 27.) A balance is sought between novelty and confirmation such that pragmatic information is produced.

Jantsch has extended this exchange in terms of dissipative structures whereby novelty becomes confirmation while evolving through instability phases such that a phase is reached which not only balances the two components, but also in the balance autopoiesis, i.e., "the maximum of exchangeable pragmatic information," renders the system self
Figure 27. Weizsäcker's Novelty - Confirmation.
renewing. (See Figure 28.) The dissipative structures, through their transformatory process, exchanges novelty into confirmation as the structure perceptively verges toward confirmation, the equilibrium structure. As maximum entropy production surpasses Area A (in Figure 28.), autopoiesis allows the system to vacillate toward another dissipative structure or to 100% equilibrium. If the new dissipative structure overwhelms the confirmation, the process continues.

The scheme according to Figure [28] also allows the representation of the change in entropy production occurring when a new dissipative structure is born. Entropy production, in this context, is nothing else but the production of structure, implying at the same time more information and more confirmation. Immediately beyond the 'chaos' of the instability threshold maximum entropy production is needed to attain a certain degree of confirmation. Area A... has to be 'won' very quickly by hard work. After the formation of an autopoietic structure, however, the system oscillates in a balance between novelty and confirmation and has to do work only to the extent that novelty must be coped with continuously as exemplified by Area B in the time unit. This work, or entropy production, never becomes zero because the structure is 'kept busy' by novelty entering through the exchange with the environment. In the scheme, it is pushed toward the left so that maintaining the balance requires ever new work (movement toward the right in the scheme). In this way, novelty is continuously transformed into confirmation. Cognition is not a linear process, but a circular process between the system and its environment.

Autopoiesis, in this scheme, implies an existence near the maximum of exchangeable pragmatic information -- a conclusion which intuitively appears correct. (Emphasis mine.)19

The salient point of autopoiesis, as entropy production increases furthering newer dissipative structures such that effective, pragmatic information results, is that as the writer writes she is both sender and
Figure 28. Jantsch's Novelty - Confirmation.
receiver of the information, both explainer and explained, both writer and what is written, simultaneously. The information that is written transforms the writer, or receiver of information, while that which is written, in turn, changes the sender, or writer. Only in this way is novelty continuously transformed into confirmation into novelty as autopoiesis is acquired for a maximum of effective information.

"Effective written communication requires the transformation of the predicative idiomatic structure of inner speech into syntactically and semantically elaborated forms." The instability threshold of inner speech in the writer is displaced by the directionality of the dissipative structure which is replaced by the equilibrium structure of syntax, what is written, whereby in inner speech information is "present at once" but equilibrates as the information evolves successively, or self-organizes as coherent behavior. "Thus, inner speech is responsible for the predicative development, the integrity, and the coherence of every utterance, no matter how broad in scope." If the scope is 100% novelty, the inner speech is exchanged with outside conditions, what becomes written, so that the novelty is coped with continuously as confirmation, and thereby coherence, is continuously maintained with the simultaneous exchange with the environment. The micro-system of the writer which is what is written at the moment of writing is, therefore, "won by hard work."

Written language demands conscious work because its relationship to inner speech is different from that of oral speech: The latter precedes inner speech in the course of development, while written speech follows inner speech and presupposes
its existence (the act of writing implying a translation from inner speech)\textsuperscript{22}

The micro-system of the writer evolves through the nonlocal language plane of dissipative structures. Inner speech flushes the system with novelty, and writing activity becomes confirmation only to be overtaken by newer structures. An exploded schematic of the original Figure 20 (Chapter Two) is Figure 29.

The micro-system, however, operates and self organizes within the macro-system. As the flow within the flow continues, chance and necessity become apparent in the totality of the movement. Prigogine and Stengers have delineated chance and necessity as viable constituents of kinetics, the study of movement.

\begin{quote}
. . . we see that the system already has a wealth of possible stable and unstable behaviors. The 'historical' path along which the system evolves as the control parameter grows is characterized by a succession of stable regions, where deterministic laws dominate, and of instable ones, near the bifurcation points, where the system can 'choose' between or among more than one possible future. Both the deterministic character of the kinetic equations whereby the set of possible states and their respective stability can be calculated, and the random fluctuations 'choosing' between or among the states around bifurcation points are inextricably connected. This mixture of necessity and chance constitutes the history of the system.\textsuperscript{23}
\end{quote}

As a system within a system, the instable region of the micro-system, chance plays the role whereby there are choices from among the dissipative structures prompted by the inner speech of the writer allowing directionality for various possible futures. The overall stable region, on the other hand, is the macro-system whereby deterministic
Figure 29. Micro-System.
aspects, or necessity, dominates. Necessity is bound in the need of the writer, expressed through motives, goals, and conditions, the need which propels the nonlocal language planes in the macro-system of writing becoming self-referential with respect to its own evolution through the higher order mavericks of dissipative structures. (See Figure 30.)

As the writer is what is written at the moment he is writing, a globally stable structure evolves self-referentially as the macro- and micro-system become inextricably connected in the exchange of writing becoming a new whole.
Figure 30. Macro-System.
NOTES

1. Micro- and macro-system are my terms. Other terms in usage are micro- and macroscopic order, micro- and macro-evolution, micro- and macro-fluctuation, and so on. In Jantsch, Erich, The Self-Organizing Universe, fuller descriptions are given of the terms.


3. The Belousov-Zhabotinskii reaction is explained in numerous texts, such as, Prigogine and Stengers, Jantsch, Briggs and Peat, to name a few. It is interesting that a representation of the reaction is depicted on the cover of Order Out of Chaos. The reaction is the following from Murray, J. D. Lectures on Nonlinear-Differential-Equation Models in Biology. Oxford: Clarendon Press. 1977.

"In a sulphuric acid medium malonic acid [Belousov, in 1959, used citric acid] is oxidized by bromate at room temperature if an appropriate catalyst is used. With cerium as the catalyst periodic changes in the yellow ceric ion CeIV are observed. The period of oscillations varies with the initial concentrations but it is of the order of a minute. When cerium is in its cerous state CeIIII the solution is clear. If ferroin is used instead of cerium the colour change is more dramatic since a small amount of the dye phenanthroline registers an orange/reddish colour when the iron ion is in ferrous state FeII and blue in its oxidized state FeIII." (p. 159-160)

"The detailed sequence of reactions for the Belousov-Zhabotinskii
oscillating chemical reaction is ...

\[ \text{HOBr} + \text{Br}^- + \text{H}^+ \rightarrow \text{Br}_2 + \text{H}_2\text{O} \]

\[ \text{HBrO}_2 + \text{Br}^- + \text{H}^+ \rightarrow 2\text{HOBr} \]

\[ \text{BrO}_3^- + \text{Br}^- + 2\text{H}^+ \rightarrow \text{HBrO}_2 + \text{HOBr} \]

\[ 2\text{HBrO}_2 \rightarrow \text{BrO}_3^- + \text{HOBr} + \text{H}^+ \]

\[ \text{BrO}_3^- + \text{HBrO}_2 + \text{H}^+ \rightarrow 2\text{BrO}_2^- + \text{H}_2\text{O} \]

\[ \text{BrO}_2^- + \text{CeIII} + \text{H}^+ \rightarrow \text{HBrO}_2 + \text{CeIV} \]

\[ \text{Br}_2 + \text{CH}_2(\text{COOH})_2 \rightarrow \text{BrCH(COOH)}_2 + \text{Br}^- + \text{H}^+ \]

\[ 6\text{CeIV} + \text{CH}_2(\text{COOH})_2 + 2\text{H}_2\text{O} \rightarrow 6\text{CeIII} + \text{HCOOH} + 2\text{CO}_2 + 6\text{H}^+ \]

\[ 4\text{CeIV} + \text{BrCH(COOH)}_2 + 2\text{H}_2\text{O} \rightarrow 4\text{CeIII} + \text{Br}^- + \text{HCOOH} + 2\text{CO}_2 + 5\text{H}^+ \]

\[ \text{Br}_2 + \text{HCOOH} \rightarrow 2\text{Br}^- + \text{CO}_2 + 2\text{H}^+ \quad (p. 199) \]


8. See Jantsch and Prigogine. op. cit.

9. Refer to Chapter Three.

10. Jantsch introduced this terminology and states that there is "no true self-organization" without internal amplification of fluctuations which constantly occurs in far from equilibrium systems.

12. Prigogine and Stengers further term the exchange as order through fluctuations and explain what is meant by nucleation. op. cit., p. 187.

"When a new structure results from a finite perturbation, the fluctuation that leads from one regime to the other cannot possibly overrun the initial state in a single move. It must first establish itself in a limited region and then invade the whole space: there is a nucleation mechanism. Depending on whether the size of the initial fluctuating region lies below or above some critical value (in the case of chemical dissipative structures, this threshold depends in particular on the kinetic constants and diffusion coefficients), the fluctuation either regresses or else spreads to the whole system. We are familiar with nucleation phenomena in the classical theory of phase change: in a gas, for example, condensation droplets incessantly form and evaporate. That temperature and pressure reach a point where the liquid state becomes stable means that a critical droplet size can be defined (which is smaller the lower the temperature and the higher the pressure). If the size of a droplet exceeds this nucleation threshold, the gas almost instantaneously transforms into a liquid."

My introductory paragraph in this chapter about rain pelting a windowpane is a microcosm of a nucleation. When the droplets merge and form a larger drop, they nucleate and drop downward as the whole space of that flowing is invaded when the larger drops
fall in the limited region of their directionality.

13. The intransitive verb, accrue, is not used in the economic sense of gaining interest or capital or to simply increase. "Accrue" comes from the Old French "accreue" meaning growth. Thus, accrue does not mean to increase by increments, which would be segmented, but to develop by natural growth. The stability of the system, therefore, grows increasingly complex allowing more instabilities such that further growth is possible as the system evolves.


17. Ibid. p. 50.

"The discussion of order is often couched in terms of information. This is of particular value for the discussion of self organization because the general paradigm embraces not only material structures, but also mental structures, such as ideas, concepts or visions. . . information [is] that which generates new information."


19. Ibid., p. 53.


CHAPTER FIVE

Nonlocal Language Planes: An Endpoint for a Continuation

The activity of writing becoming emanates from a need to take a risk. In this instance, the risk involves a hunch about exchanging sequentiality with simultaneity, for portraying the observer who is the observed at the moment she is observing in the nonlocalized planes of her motive, goals, and conditions dialectically interacting with thoughts, inner speech, and words as they are dynamically reflected and reflecting in an irreversible, ongoing flow of an implicate order throughout the conflicts and balance of dissipative structures in an explicate order, all of which, simultaneously, intrapenetrates a micro-system which interpenetrates a macro-system as both systems self-referentially organize, evolving into a new whole in a far from equilibrium environment.

After a new whole emerges from the nonlocal language planes, the system begins to "damp" the self-amplifications of the fluctuations. Damping decreases the amplitude of a wave, in physical terms, or minimizes the fluctuations of the language planes, in writing terms. Damping is possible because of a need, also: the need to reach an endpoint, momentarily. When a system begins to intuitively damp the structure of a new whole, a recapitulation is not a necessary element, for the history of the writing has unfolded.

The need for an endpoint in writing is requited by the continuation
of the disorder in the outside conditions. The endpoint becomes, then, a
continuation of disorder into order, that which is not beyond our
becoming.
APPENDIX A

Glossary for Chapter One

**autopoiesis**: introduced in 1973 by Chilean biologists, Numberto Maturana and Franciscon Varela with Ricardo Uribe. "Refers to the characteristic of living systems to continuously renew themselves and to regulate this process in such a way that the integrity of their structure is maintained." (See Jantsch, E. *The Self-Organizing Universe*.)

**Awe, Land of**: a mechanically geared world in which a product is expected, all conclusions based solely upon empirical calculations in which aspects of living functions are solid and rigid; the carryover of the Industrial Age in which clockwork-like mechanisms are said to explain the whole of reality through the dissection and delineation of the parts.

**bifurcation point**: in social terms, a bifurcation represents fluctuations which are exemplified in evolutionary changes or new choices made in a culture; in physics, a threshold of stability (a "thermo-dynamic branch") may be reached and thereafter instability becomes apparent with respect to the fluctuations of the system, a "choice" is then made between or among new routes for the system to take, and the choice that is made is the bifurcation point.
breathtaking equation: a mathematical formula that is impossible for the layman to decipher.

CroMagnon mind: refers to the historical significance of CroMagnon man following Neandethal man evolutionarily.

dissipative structures: arise out of nonlinear processes in non-equilibrium systems which allow the system to fall into chaos or jump to a higher level of order or organization; is determined after the evolutionary moment of the bifurcation point.

doppelganger: a ghostly double of a living person who will haunt its own flesh and alive counterpart.

explicate order: that which is immediately seen or felt.

far-from-equilibrium: conditions in which nonlinear relationships prevail, system which is extremely attuned to external influences, process whereby small input yields huge effects, and a system with the capacity to self-organize.

Fourier (foɔ̃-ryá'), Baron Jean Baptiste Joseph: 1768-1830, French physicist and mathematician.
gadfly: someone who flits about acting as a constructively provocative stimulus and is habitually engaged in criticism of existing institutions.

high risk takers: anyone who does not subscribe to the conclusions of the scientific world based upon the results found in the Land of Awe; also those who are willing to see a reality "unrelated to our beliefs, our ambitions, or our hopes" (Prigogine), to see a reality not based upon a monologue with nature, but a dialogue.

history: chronicle of the relationships, interrelationships, and intra-relationships of a system; the events which have made the system what it is as it becomes whole.

hologram, holography: see Chapter Two.

hunch: an intuitive feeling, an educated guess; hunches may lead to new paradigms but are not paradigms themselves.

implicate order: the undivided whole of our reality in which there is constant flow; moreover, in this order the observer and the observed merge.

irreversibility: when a system is random there is a difference between past and future, for at each moment the process of the system is
is different such that every process of the whole has its own history; characterizes open systems.

linear function: defines a closed system which has reached equilibrium; a stationary state.

magical hat: what one could place upon one's head whereby the brain and the mind could be separated as two distinct and separate parts not of one whole.

mind-brain relays: a pun on the word relay, as a foot race in an Olympic game and as an electrochemical nerve response in the brain.

movement: see Chapter Two.

Neanderthal brain: see CroMagnon mind.

nonbelievers: those who do not accept the percepts of the Land of Awe; also, scientists who have moved away from the reductionist, positivistic view of the world.

nonlocal plane: an area of consciousness not bound by sequentiality; is unbound by simultaneity of unity with relationships to all phases of living systems.
nonlinear function: defines an open system which is far from equilibrium; is dynamic, random, and in a state of flux.

pawnbrokers: scientists who define reality in empirical terms only and believe in ultimate dissection of parts to define the whole and do not believe in putting the parts back together.

reality: irreducible multiplicity of relationships; the holomovement; tenure for unlimited access of unity among all things.

Reduction Olympics: the games the pawnbrokers play in order to reduce reality to parts, the outcome of which is a positivistic view making the universe a static realm.

relatively autonomous subtotalities: those things in the explicate order which may be considered separate but in a relative way; they are wholes within themselves deriving from a larger whole; what makes subtotalities stable is not their separateness but their movement in the whole.

rulers: synonymous with pawnbrokers, the scientists in the Land of Awe.

self-organization: the process of self renewal which recognizes the interconnectedness over space and time of all dynamics; the role that
fluctuations play in the creativity of an evolution which is emerging.

**social science pawnbroker**: a positivistic, reductionist sociologist or other person in the social sciences.

**Solemn Oath of Aw(e)ful Reality**: the belief that in an experiment the observer and the observed are separate and do not influence each other.

**time equalled time**: a closed system in which time is reversible and the history of the system is irrelevant.

**tournament of skill**: the competitiveness of scientists defined by their experiments based upon empirical facts.
Dear F.A. -

The single moment which is all the moments, at this time, approaches. The deluge of the dissertation is upon me. The interreticulated quality of written communicative competence unfolds as the high risk occupation of placing and displacing my thoughts somehow join together to produce some kind of whole. I cannot be sure whether this occupation will produce epistemic prolixity or, at the other end of the continuum, the blank page. (What horror! That could be a monster flick: "The Blank Page - in 3D").

The activity of writing must be investigated through the individual and the society. It involves subjective and objective activity; it is not fossicking for the "right" word nor is it inner speech derailed from my mind unto the tracks of the paper. "Fossicking" is an Australian word meaning to hunt savagely for, like when we were hunting for opals. Dad says he's never fossicked anything, if, indeed, that's the word. In any case, I think my writing should nurture personal growth and social awareness. I am, then, intimately involved in an ongoing, developing, dialectical relationship with language as the thoughts evolve into words while the words kiss the paper and entice me into further thoughts. A beguiling proposition. In approaching personal writing, the approach is also societal literacy.

Nothing whatsoever exists independently. There are moments of actions in writing, moments in their own development, moments with and moments through the whole of the exposition. This is relationship; a scintillating, titillating process viewed as that which exists between and among entities and how it exists itself through the irreversible time scheme in which we are embedded. The basic unit of reality is the relation, and even that becomes a misnomer since reality is not a unit at all. Units are not in flux, so I'll have to amend the description by saying that reality is a tenure for unlimited access of unity among all things. How neatly we can file away a definition with mere words. Yet, you know what I'm moving toward, and the movement is what is crucial.

You remember our good buddy Lev (Vygotsky)? We call him the forerunner of the sociohistorical approach to language. He views thought and language as a relation through a dialectical process. The process exhibits itself through activity whereby children are the "active learners able to unite their experience to form critical human consciousness." The logical query is: how do they accomplish this? An oversimplified response is: it is the dialectical mode which allows meaningful interactions with their own environment. A more sophisticated,
and more scholarly, answer is that children (with or without the aid of teachers, more often without) are interactionists with their communities, and their inner language unfolds to form the groundwork of competent oral communication. The dialectical process thereby fulfills the demands of language through human consciousness.

So, what of the society as it functions in the daily language upheaval? Language is social with all the exotic and the mundane in the brouhaha of all the individuals in the society. The crux is the inevitability of the relation of the individual to the whole. Our other good buddies, Dad and Son Leont'ev, wrote one of my favorites: "Language is ... a reflection of reality which is refracted through the prism of socially accumulated experience embodied in language." (Now that's words kissing the page.) I've managed momentarily to elucidate the preciosity of that statement -- individuals learn language which is necessary to becoming a part of society, while at the same time, the society is made up of individuals who share the language of the society. This is viewing language dialectically, as a relation between the individual and the society. Language generalizes the sociohistorical experience of society and passes it on to individuals.

Here I am, still, thinking of my own writing, particularly as I plunge into the dissertation on something as chaotic as language and writing. What are my interactions with reality that are causing me to expurgate the little I do know of language activity? When my students sense difficulty in writing tasks, I go through those eight steps that The Editorial Group Collective wrote in the late 1970's. I should answer my own questions here.

1) "legitimize writing": the dissertation is legitimate only if I understand my needs; my need is to flog the notion of the linear writing process, particularly as I've observed teachers and student teachers promulgate the step-by-step static pre-write, write, revise, edit syndrome into the otherwise normal writing habits of students.

2) "make it historical": I've located myself in history as a teacher, and what I write impinges upon my experiences as a teacher and predicts what I write concerning my needs and those of students.

3) "make it critical": I realize that what I've written can be changed as my history irreversibly proceeds; although I must finish this dissertation and produce a product, I will retain the realization that what is written will certainly fluctuate as time passes.

4) "see it as action": I am enthralled with David Bohm's work simply because it epitomizes action, ceaseless movement, in reality, and writing becomes action and actions.

5) "draw in new social experiences": my committee embodies new experiences in this realm; they know what they're about and add more relations to what I attempt to do.
6) "combat the subordinate mentality": you know me well enough not to dwell upon this thought.
7) "take control of my own learning": the best is that I'm enjoying the writing of this dissertation such that I control the dissertation; the dissertation does not control me.
8) "demystify learning": I suppose one has to learn to write a dissertation, much as anything else; the demystification comes in the doing.

I've conjured up quite an image of myself as the percipient of writing activity. As I lounge on the front porch with a wide-eyed gaze at the lake, I wonder what distinguishes my written competence from the interreticulated network of the same competence of a literate society. To thoroughly document and completely illuminate to the utmost extent an analysis of my writing, I should very well be forced to satiate my entire consciousness and to collapse the contingency of over three decades of experience with language. I'm not that good. I'm still learning.

Affectionately,

R.

R.
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