

# Relational Systems :

A Review Emphasizing

WHOLE (Wave;Field;Energy-Information)/ PART (Point;Particle;Atom-Quantum)

INTERRELATIONS \*

by Jon Ray Hamann, Norman Hirst, Jere Northrop and Robert Sachs

## Foreword

**RELATIONAL SYSTEMS** is founded mainly on the experiential recognition of the essentiality of *relation*, especially the *interrelation of relations*, a thesis which is in direct contrast to the historical and current emphasis on *system*, particularly on things and thingness. Although the relational symbol forms which are reviewed herein are intuitively commonplace, their explicit conceptualization is radically new and unique. Hence, it is to be expected that there will be a strong resistance to this work, on the one hand from the intuitionists without a conceptualization, who will ask - what's new? -, and on the other hand from the rationalists without a vision, who will say - it can't be!

We intend in this paper to review an aspect of our work on **RELATIONAL SYSTEMS**. Although there are a number of literature references, the paper is essentially self-contained for the inferentially imaginative, albeit the language may occasionally appear exotic.

*"To explain anything exotic, you have to convey at once the thing and the vocabulary to talk about the thing."*  
Marge Piercy, *Woman on the Edge of Time*.

*"In sum, it is my present conviction that the Moebius principle must encompass a new way of writing, one that goes beyond the objectification of wholeness to encompass the deeper wholeness of object and subject. Moreover, this radically holistic mode of expression would require and invite reciprocation on the reader's part: its effectiveness would depend on us."* Steven Rosen, *Science, Paradox, and the Moebius Principle: The Evolution of a "Transcultural" Approach to Wholeness* (State University of New York Press, Albany, 1994).

For those who would like a brief perspective, rather than to inquire of details for an initial appraisal, there are four "exemplars"-- 1. interrelated relations; 2. whole/part relations; 3. fields; 4. atoms-- presented as "Addendum I - Exemplars" which, when taken together, fairly convey the intent of **RELATIONAL SYSTEMS** Research as summarized herein. A more detailed outline focused on Relational Theory Construction is also included as "Addendum II - Relational Systems: Annotated Outline".

## Introduction

The history of "recent" human evolution is significantly a record of the evolution of rational symbol systems, that is, of systems which conceptually image and extend human experience, both past and projected. Scattered throughout this history have been a few revolutionary developments which most profoundly influenced the subsequent nature of human existence. Such developments include written language; mathematics; the scientific method; the industrial and technological revolutions, especially the technology of the media ranging from the printing press, to radio, film and TV; Xerox; and the computer revolution. And yet, despite this extended "golden age of rationality", there is an ever growing suspicion that something is awry.

"In the continuous process of establishing and extending their image of being, humans seem to have always found themselves striving toward and within either of two apparently mutually excluding systems - generalization or specialization, universality or particularity, unity or diversity. Humankind has not succeeded in (achieving the possibility of) resolving this dichotomy, basic to their becoming, into a dielectric mode, and synthesis has usually been a retrospective reconciliation of past and disjoint theses.

\*This paper is a revision/updating of the prior publication, J. R. Hamann and J. C. Lamb, *Relational Systems: A Review Emphasizing Whole (Field; Energy)/Part (Particles; Atom) Interrelations in Relational Life-Systems Theories*, *Human Dimensions Journal* 6, No. 2, 20 (1978).

When the arrow is pointing toward unity people become uninterested in reclaiming the particular. When engaged in furthering their specialized knowledge they do not see any immediate need to recognize in it a particularization of general principles. In other words, even granting that we know what we mean by unity and diversity, we have been unable so far to relate them in a bidirectional fashion and explicitly state the decision mechanism that would allow us to pass from one to the other in either direction. Only when it is too late - when the transient impetus that has pushed us in a particular direction appears exhausted and progress becomes intolerably difficult - do we reverse our direction.

The psychological reason for this lies in the rigidity with which the human society protects itself against change, against the threat posed by anything that could disrupt the collective effort in achieving what has been set as an immediate goal but has been identified as ultimate to guarantee a sufficiently strong motivation for individual action. In this sense humans extend themselves in an almost uncontrolled way, the loose boundaries and the turning points being determined only by the sudden realization of immediate urgencies, that is, by precipitous crises of identity." (1)

Throughout this history there is also the recognition that whenever recurring crises seem most intense, rational process itself, rather than specific rational symbol systems, becomes the focus for criticism. During this period there is always an increased tension between the rationalists and materialists on the one hand and the intuitionists and mystics/spiritualists on the other. At this time nearing the end of a century this tension is again coming to dominate the expression of the schism in humanity. Hence, in response there is a worldwide endeavor to compatibly reunite the rational and intuitional in new symbol systems manifest through their effectuation in human action.

It is our contention that all preceding "revolutionary" developments of new symbol systems which seemingly resolved the immediate crises of the time, were really only variations on the theme of a single symbol form. In fact, it is a matter of record that throughout history human symbol systems have largely been of one explicit form, namely the INTERRELATION OF SYSTEMS. The implicit assumption in this world view (let us summarily denote it as the SYSTEMIC world view) is that all systems can be connected through singular relations and that all relations exist only between systems. Although there are (almost) uncountable specific realizations of this idea, it still remains a singularly constraining form controlling nearly all symbol creations.

For example, in biology it has resulted in the reductionist cell-molecular biological theory. In psychology it has led to the stimulus-response robot model of human behavior. And finally, it has led to the development of a (finite state automaton) machine-like society, almost completely directed at the satisfaction of need, largely excluding consideration of creative extension, and hierarchically structured to effect centralized unidirectional societal controls.

In an attempt to avoid being misunderstood, we should emphasize that we are not saying that this world view is wrong. Obviously there is an aspect, perhaps even the predominant aspect, of human experience which is consistently imaged in this symbol form. To cite only one current successful example, we note the brilliance and excitement of the SYSTEMIC physical/engineering achievements of the international space program.

In contrast, however, we must also note the failure of the associated exobiology program. This failure derives from the fact that physics/chemistry is not biophysics/biochemistry unless one knows from prior evidence that one is dealing with a life system. But then the entire purpose, for example, of the Viking biology package was specifically to establish that prior evidence; that is, to confirm or deny (or at least to add some weight of confirmation or denial to) the Mars life-hypothesis. The experimental dilemma which derives from this attempt to analyze life systems as though they were only complex physical systems is not the consequence of irrationality. On the contrary, this is pure rational systemic reductionism, an ordinarily healthy human process now out of ordinary human control; a pathology some feel may threaten humanity itself! Indeed, when the arrogance of a methodology (i.e., the causal methodology of systemic reductionism) leads to the expenditure of billions of unknowing (and perhaps unwilling!) taxpayers' dollars without a philosophical/ theoretical/experimental alternative as a control (as per the fundamental tenet of science), only a profound metamorphosis in humanity can neutralize the insanity of pure positivistic mechanism in science.

What we are saying is that this SYSTEMIC world view is incomplete, especially when imaging life systems. Moreover, it is evident that most persons are at least intuitively aware of this inadequacy. However, without symbol

systems other than those of the INTERRELATION OF SYSTEMS form, there has been no vehicle for explicating and communicating these intuitions.

As was noted above to be generally characteristic of recent human evolution, so also is it specifically the case that the history of natural philosophy and science is essentially a record of the recurring rise and fall of various specific forms of the underlying presumption of binarity or dualism, especially in the form of binary opposites. This is not to diminish monistic or pluralistic systems of thought. Nevertheless, the emphasis has been and clearly remains dualistic, frequently, of course, with some superimposed synthesis of difference as in the method of the dialectical synthesis of opposites. The most general conceptualizations of this presupposed binarity or duality are "system/not-system" and "system/subsystem", respectively. Examples of each abound. In the system/not-system case one might note that a key mathematical feature of deductive logic in one form is its composition as a Boolean algebra of propositions (that is, of true or not-true (false) statements). In the system/subsystem case it is significant that the course of developments in twentieth century mathematics has been largely influenced by the axiomization of the algebra of sets (subsets).

*"Can science achieve a unified theory of complex systems? Even at the Santa Fe Institute, some researchers have their doubts."* John Horgan, *From Complexity to Perplexity*; *Scientific American*, June 1995.

*"A first glimpse of a postmodern physics, in which mass, inertia and gravity arise from underlying electromagnetic processes."* Bernhard Haisch, Alfonso Rueda and H.E. Puthoff, *Beyond E=mc<sup>2</sup>*; *The Sciences*, November/December 1994.

In the present context we want to focus on the subsystemic (particular) concept of "atom" which is defined as a nonreducible subsystem and the systemic (holistic) concept of "field" which has been classically defined only in terms of the interaction-at-a-distance of two or more systems. Throughout the various "ages" in the development of science, there has existed a strong resistance to specific forms of both concepts. And so it is at present. There is now almost universal opposition to the hypothesis that there exist atoms of life (bions), atoms of behavior (psychons), atoms of humanity (socions), etc. Correspondingly there is a widespread denial of the possibility of action-at-a-distance experiences which are not explicable as physical (e.g. gravitational or electromagnetic) field phenomena.

## Relational Presumptions

*Personal Experience is the Existence of RELATIONAL SYSTEM. By Presumption, this is the Essence of Existence (Nonexistence) beyond the Personal. RELATED*

In the preceding section we have noted that throughout history symbolic systems have largely been confined to the form of the INTERRELATION OF SYSTEMS; that is, of the form

$$\text{RS-1: } \text{SRS}' \text{ or } \text{SRS}'' \text{ or } \begin{array}{c} \text{S}' \\ \text{SRS}'' \text{ etc.} \\ \text{S}''' \end{array}$$

where R denotes "relation" and S, S', S'', S''', . . . denote "systems" (or "subsystems").

Recognizing that the INTERRELATION OF SYSTEMS symbol form is an insufficient(presumptive) foundation for consistently imaging human experience, we have, as a transcendent act, introduced the general presumption of the existence of four relational forms: RELATED-NESS (sometimes referred to as SELF - RELATION), the INTERRELATION OF SYSTEMS the INTERRELATION OF SYSTEMS AND RELATIONS, and the INTERRELATION OF RELATIONS. These four forms exhaust the number of possible categories which can be obtained by combining "systems" and "relations" through "relations". The last two of these forms have no explicit historical precedent and it is our creation and actualization of these transcendent forms which is the unique and radical departure point for a SYMBOLIC RELATIONAL (R)EVOLUTION.

We note without comment that there are numerous features of these presumptions which might be extolled by some as having universal virtue in and of themselves. For example, there is the "fourness" of the system which is assumed to be fundamental in many cosmologies!

## RELATIONAL IMAGE SYSTEMS

### RELATIONAL PHILOSOPHY (2)

(WHOLE IMAGE SYSTEM(S))

The following excerpt is included to ease the way into this rather abbreviated but condensed section. "Universally fundamental to relational systems formalisms is the explicit acknowledgement of the presumptive basis underlying specific formal systems. Hence our construction begins with a statement of the philosophico-logical presuppositions of system (including subsystem and image system) and relation (including "decision" relation).

The most pervasive primitive concept emerging from our immediate experience is that of "thing" and we will here refer to it as system. In conjunction with the recognition of thing is the experience of related things, especially "things within things". This last relation we term subsumption and a system subsumed by another we call a subsystem. But two things can also be experienced as related by some "similarity" or "affinity", one seems to "typify" another. We will say that one system images another and that one system is considered as an image of another. For example a system might be imaged by another system that explicitly represents the interactive processes involving the subsystems of the former. Given a system, some of its subsystems can be selected and combined according to certain relations describing the system so as to yield an image of another system. We will call these sub-systemic relations decision rules and we will refer to this action as a decision process."(3)

With the specific existential presumption that the four relational forms are realizable via the relations (systems) of SUBSUMPTION ( $\S$ ), IMAGE ( $\mathcal{I}$ ) and INTER (ACTIVE) RELATION ( $\mathcal{I}aR$ ) the foundation for the development of RELATIONAL PHILOSOPHY was laid.

*The simplest form or structure we can imagine is a distinction. A distinction can be defined as the process (or its result) of discriminating between a class of phenomena and the complement of that class (i.e. all the phenomena which do not fit into the class). As such, a distinction structures the universe of all experienced phenomena in two parts. Such a part which is distinguished from its complement or background can be called an indication (Spencer-Brown, 1969). If more than one distinction is applied the structure becomes more complex, and the number of potential indications increases, depending on the number of distinctions and the way they are connected." F. Heylighen, *Distinction: Principia Cybernetica Web*:*

<http://pespmc1.vub.ac.be/DISTINCT.html>

Implicit in this philosophy are innumerable possible cosmologies & cosmichaologies (see below for an explanation), from which specific ones must be chosen as foundations for the development of specific relational symbol systems. Assuming generally that every experience is representable through the conjoint use of systemic and subsystemic symbols and then assuming in the first specific instance that the existence of a system implies also its non-existence, that is, that which it is not or, by definition, its "environment", there are foundationally three and only three classes of descriptors necessary for symbol construction. In this first approach they are: ONE SYSTEMIC DESCRIPTOR FOR THE INTERRELATION OF A SYSTEM WITH OTHER: TWO SUBSYSTEMIC DESCRIPTORS, ONE FOR INTERSUBSYSTEMIC RELATIONS AND ONE FOR THE INTERRELATION OF THE SUBSYSTEMS WITH OTHER.

In this case we have the basis of a *cosmichaology*. The reason for this terminology is as follows. Because of the presumption of "an-other system", there is always a recognizable non-wholeness or incompleteness in any system. This in turn implies a possible *disorder/indeterminancy* (chaos) which is *ordered/determined* (in cosmos) by the cosmichaological relations.

*"Whether we are dealing with physical, biological, social, economic or symbolic systems, the concepts of order, complexity, and emergence are intimately involved with hierarchical structures." J.S. Shiner, Matt Davison and P.T. Landsberg; **Order, Disorder and Complexity in Hierarchies**,*

In contrast a second approach is to begin with ONE SYSTEMIC DESCRIPTOR FOR THE WHOLE and TWO SUBSYSTEMIC DESCRIPTORS, ONE FOR INTERSUBSYSTEMIC RELATIONS AND ONE FOR THE INTERRELATION OF THE SUBSYSTEMS WITH THE WHOLE. In this case we have the basis of a cosmology since there is assumed to exist a system-as-whole. Either or both or a mixture of these approaches can be invoked with experiential consistency. In either approach, specific cosmological or cosmichaological relations (e.g., laws of nature) are given as SYSTEMOGENIC and SUBSYSTEMOGENIC interrelations of a system and its subsystems in terms of these three classes of descriptors using the four relational forms as specified via *S, I, IaR*.

### ***BEGINNING WITH PARADOX IN PHILOSOPHICAL FOUNDATIONS INQUIRY/DIALOGUES***

*Inherent in the primal experience of thing (SYSTEM) is that of other-thing (other-SYSTEM) and subsequently of no-thing (NOT-SYSTEM). Hence, from a System-as-Totality world view, SYSTEMOGENESIS (SUBSYSTEMOGENESIS) by its nature simultaneously generates OTHER-SYSTEM which implies BOUNDARY (between SYSTEMS) generation and, consequentially, PARADOX. BOUNDARIES and PARADOXES are mutually generative.*

*We have initiated a comprehensive program directed at the identification, classification and documented resolution (or lack thereof) of Paradoxes and their solution/generation via (1) a hierarchical system → other system shift, (2) the implication in interrelational experience of the appearance of apparent non-paradoxical reality, and (3) the whole (being no-thing) taken as interrelated relation.*

*Obviously, the attention has been anything but simple; witness, Russell's Paradox, Gödel's Incompleteness Theorem, the Einstein-Rosen-Podolsky Paradox, Bell's Theorem, Complementarity, Indeterminism, Zen Windows, etc., etc.*

*An insightful book is that of*

*John Gall, **Systemantics: How Systems Work and Especially How They Fail** (Pocket Books, New York, 1978),*

*but by far the most profoundly influencing exposé comes from*

*Douglas R. Hofstadter, **Gödel, Escher, Bach: an Eternal Golden Braid** (Basic Books, 1979) and **Metamagical Themas: Questing for the Essence of Mind and Pattern** (Basic Books, 1985).*

#### *About the Author*

*DOUGLAS R. HOFSTADTER, best known as the author of **Gödel, Escher, Bach: an Eternal Golden Braid** (Basic Books, 1979), also co-edited *The Mind's I* (Basic Books, 1981) with philosopher Daniel C. Dennett, and for two and a half years wrote a monthly column ("Metamagical Themas") for *Scientific American*. Having spent the last several years in the Computer Science Department of Indiana University in Bloomington, Indiana, he has recently joined the faculty of the Psychology Department of the University of Michigan in Ann Arbor, Michigan, where he occupies the Walgreen Chair in the College of Literature, Science, and the Arts. His current research projects in AI (artificial intelligence) are called *Seek-Whence*, *Letter Spirit*, *Copycat*, and *Jumbo*. His focus is on stochastic parallel models of analogical thought.*

R. Elated, ***Self-Reflective Dialogues*** (1998)

#### **A. Maximization/Minimization Relations**

Systemogenic/subsystemogenic interrelations are either explicitly or implicitly generally represented as maximization/minimizations relations. To see why, consider the example of a relational system specialized as a "temporal relational system." Existence of the former implies continued existence (i.e., existence in time or

persistence) of the latter. But persistence is, by definition, stability. Now we note that persistence of a temporal relational system (i.e., system stability) can be realized identically or partially. In the first case, identical persistence, there are two forms: static (no change) and dynamic (change with recurrence). In the second case, partial persistence, there is implied some (degree of) sub-systemic change. To say that a system exists in the case of subsystemic change is meaningful only if the change is minimal by prior decision (recognition). Other than such decidedly minimal change would obviously imply that the system does not exist, but rather that some other (changed) system does exist. Minimum change implies maximum stability.

In general, systemogenic/subsystemogenic relations imply that a system exists if and only if an extremization (maximization or minimization) relation exists. In a subsequent section we summarize briefly our work on the "maximum systemic probability principle" and its implications for control/stability theory. This is critical since this principle is an effective representation of the realization of interrelated relations as wholing relations of relations. In the cosmological case, this follows from: *to whole is to maximize order*.

## **B. Relational Theory Construction (4)**

At the outset it must be stressed that "general systems theories" as developed historically are not necessarily "relational systems theories." The former have managed successfully to reemphasize the importance of the system in contrast to exclusive consideration of the subsystem in theory construction. Despite the importance of this contribution, we point out subsequently herein that "relational life systems theories" depend upon descriptors which are meaningless unless subsystems and systems are both rationally integrated in the same descriptor. We will further note that the development of these descriptors necessarily implies the use of INTERRELATION OF RELATIONS formalisms. "General systems theories," however, have heretofore only used INTERRELATION OF SYSTEMS (causal) formalisms and to that extent are therefore only approximately applicable.

In the subsequent parts of this section we outline a general format for relational theory construction presupposing a cosmological foundation. The reason for including this section herein is to lay the basis for understanding the origins and nature of a multilevel theory of experience. This is required for consistently resolving differentiated fields, for example, for distinguishing purely physical fields from life fields. See "Addendum III – Fields"

### **1. The Initiating Experiential Sublevel**

The initiation of a theory begins with experience in which the existence of specific *relational systems* are identifiable. On the basis of this identification and within the framework of the choice of cosmology and certain associated linguistic, philosophical, formal, and theoretical constructs, this experience is presumed to be in essence generalizable existentially (non-existentially).

### **2. Continuing Symbolic Sublevels**

The first step in this generalization is to posit specific symbolic descriptors and to assume particular formalisms for their interrelation.

Secondly, the formalization of an "order (deterministic) system" including "order decision relations"(representing, for example, the choice of initial conditions) must be completed within the assumed formalism for the posited descriptors.

Thirdly, specific "relations of this order system with experience" must be postulated. These relations through which the symbol system is actualized are termed correspondence (to "reality") rules in physical science. If in terms of these last relations it is found that the order system is consistent with experience, it can be assumed that the theory is adequate; or an attempt to improve or extend the theory may be undertaken by recycling (changing the order system); however, if it is found to be inconsistent, the following additional steps are required.

Fourthly, the formalization of a "disorder  $\rightarrow$  order (probabilistic)" system including "disorder  $\rightarrow$  order decision relations" must be completed within the assumed formalism for the posited descriptors.

Fifthly, again specific "relations of this disorder  $\rightarrow$  order system with experience" must be postulated. As before, if in terms of these last relations it is found that the disorder  $\rightarrow$  order system is consistent with experience, it can be assumed that the theory is adequate; or an attempt to improve or extend the theory may be undertaken by recycling (changing the order system and/or the disorder  $\rightarrow$  order system); however, in this case, if it is found to be experientially inconsistent, it may be necessary to return to the initiating sublevel and, for example, alter the choice of cosmichaology and/or the associated philosophical, linguistic, formal, and theoretical constructs. Alternatively, however, an attempt at the resolution of the inconsistency (paradox; indeterminacy) may be made by formalizing the indeterminacy through the construction of a "next level". It is via this latter procedure that one passes hierarchically from "formons" to "nuclons" to "chemons" to "psychons" to "bions" to "socioions" to "autons". In a subsequent section, without pursuing the entire formal construction in detail, a brief review of parts of this hierarchy will be given.

## Relational Formalisms

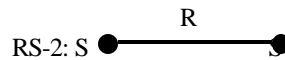
(GENERAL CLOSED IMAGE SYSTEMS)

Subsection A below presents examples of possible forms for RR-formalisms. Subsections B and C present mathematical (SS-) formalisms which are useful as metaphorical guides in formalizing RR-systems.

### A. Possible Forms

#### 1. R-Graph Formalisms(2)

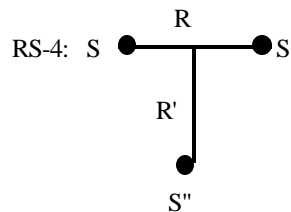
We include this section to review a formal representation which, because of its graphic nature, has greatly aided in explaining the four relational forms. By way of introduction, it need only be known that a "graph" is by definition a "set of points connected by a set of lines". The lines may be directed or undirected. For the record we note that a graph can formally model any mathematical system of binary systemic order. Hence an elementary graph with points (systems) S and S' connected by the line (relation) R



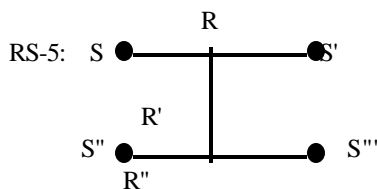
is a representation of the SS-system

RS-3: SRS'.

Since all of mathematics is of this INTERRELATION OF SYSTEMS form, the following two representations would be undefined within the context of any presently existent mathematical formalism; hence, they are ideal in contrast for representing our newly presumed relational forms:



and



Obviously these are representations of

$$\text{RS-6: } \begin{array}{l} \text{SRS}' \\ \text{R}'' \\ \text{S}'' \end{array}$$

and

$$\text{RS-7: } \begin{array}{l} \text{SRS}' \\ \text{R}' \\ \text{S}''\text{R}''\text{S}''' \end{array}$$

respectively.

Via a generalization of the concept of graph so as to include the representations exemplified in RS-4 and RS-5, we have introduced the notion of a relationograph (R-graph) with the intent of developing the associated formalisms. The important point here is that RS-4 and RS-5 are by definition not reducible to RS-2. The graphic construct which introduces this novelty is that of two lines joining without a point.

It should be observed in contrast to the above, however, that the usual procedure for symbolizing experiences of the form of RS-5 or RS-7 is as follows. If SRS' and S''R''S''' are redefined as other systems, X and Y, respectively, then RS-5 and RS-7 are reducible to the RS-2 (INTERRELATION OF SYSTEMS) form, XRY. This is the crux of systemic reductionism. What we have intended to clarify through this brief summary of the R-graph formalisms is simply this. If any aspect of experience is representable via RS-5, then it can only by formal metaphor be represented by RS-2. In subsequent sections we will argue that this is explicitly the case for the representation of all life phenomena.

## 2. Multiboundary Mathematics

"Formal Formulations", Robert Tufty, [http://www.formal.com/ff\\_inc.html](http://www.formal.com/ff_inc.html)

"Ons Algebra: The Emergence of Quaternionic, Octonionic and Clifford Algebra Structure From Laws of Multiboundary Form", <http://goertzel.org/ben/Multi.html>

## 3. Combinators

"Relational Systems and Logic", Norm Hirst

# RELATIONAL SYSTEMS AND LOGIC

Relational systems call for a radical revision of our notions of logic. Traditionally logic has not supported relations between relations. Also, traditional logic does not support "internal" relations. Internal relations are relations that change the related elements. For example, while John is taller than Mary has no effect on John, John loves Mary does. Taller is called an external relation while love is called an internal relation.

This is a good time to face the need for radical revision. Logic hardly changed from Aristotle to this century. Now there are many systems of logic. Some are just different versions of the same logic, such as the propositional calculus based on axioms and rules of inference or the propositional calculus based on so called "intelem" proofs with no axioms. In addition, there are over 30 varieties of nonstandard logic. For example, "relevant logics" in which "p implies q" only if p is relevant to q, e.g., p is used in deriving q. This prevents the paradoxes of material implication while, in one such system, requiring eight truth-values for a model.

Even discussing the general characteristics desirable in logic can be frustrating. Once upon a time consistency was paramount. Now paraconsistent logics are acceptable. In paraconsistent systems contradictions do not imply any and every proposition. Contradictory statements (p and  $\sim$ p) are both true and false. Also, contradictory statements may be viewed as oscillations.

As we investigate relational systems we need to cast our inquiry with formal methods. Traditionally this has meant applying mathematics. But, of course, mathematics itself is based on versions of logic. New logics can lead to new mathematics. People are now talking about boundary mathematics and paraconsistent mathematics. We require a formal method for the study of logics and exploration of possible new forms of logic. For this I suggest a class of systems known as combinatory logics. "Combinatory" should not suggest combinatorics. "Combinatory" refers to combinators or operators for forming combinations. Also, it might be better to think of combinatory logics as being epi-logics.

Combinator systems are applicative systems; that is, application is the only binary operation. To apply the function f to the function g one would write simply fg. Also, there is the convention that parentheses cluster left. Thus, for example fgx is the same as ((fg)x). This would say that f is applied to g and the result is applied to x. Of course, one might want to apply g to x first before applying f. To do this requires combinators, i.e., operators for forming combinations other than those that can be expressed simply by application. For example, there is the combinator **B**, called a compositor, which obeys the following rule:

$$\mathbf{B}fgx > f(gx)$$

The character > means "reduces to". That is, one removes the combinator and rewrites the string that follows according to the rule.

Typically one builds a system of logic by beginning with formation rules specifying the requirements for being a well-formed formula, a WFF. WFF's form a domain of discourse. If the domain of discourse does not permit expressing what a subject matter requires then the logic can not be applied. Thus, typical logic systems do not permit expressions required for relational systems. In contrast combinatory logic demands that any construct formed from the primitive entities by means of the allowed operations must be an admissible entity. Now, if I may quote Haskell Curry, "We can no longer 'explain' a paradox by running away from it; we must stand and look it in the eye. Something is gained by the mere bringing about of this state of affairs"<sup>1</sup> Similarly, I suggest that something will be gained by combining the power and scope of combinator systems with the requirements of relational systems.

Shoenfinkle first introduced the idea of combinators, around 1924 to solve the problem associated with substitution of variables. Such substitution seems simple enough. Assume a function such as  $x^2+3$ . To apply this function to 2, one would simply write  $2^2+3$ . However, the substitution process can quickly become error prone; particularly when functions are applied to functions and there is no good mechanical procedure to carry out the process. The problem of substitution of variables is of such difficulty that the first solution for it was Church's lambda calculus developed in the 1940's. Shoenfinkle's solution was to eliminate the use of variables. Thus there are no variables in a combinator system. There are only constants. But, of course, there may be variables in the language used to talk about the system, i.e., the U-language. The combinator rules are expressed in the U-language.

Haskell Curry, who was Shoenfinkle's graduate student in Germany, went on to develop combinators and became "the father of" combinators as we know them today. Let us consider the basic five.

---

<sup>1</sup> *Combinatory Logic*, Curry and Feys, North Holland, 1958, p5

|                         |   |
|-------------------------|---|
| $\mathbf{I}x > x$       | (elementary identifier, expresses a variable as a function of itself)             |
| $\mathbf{C}fxy > fyx$   | (elementary permutator, Cf is the converse of f)                                  |
| $\mathbf{W}fx > fxx$    | (elementary duplicator, e.g., if M is multiply $\mathbf{W}Mx$ is the square of x) |
| $\mathbf{B}fgx > f(gx)$ | (elementary compositor, represents the composition of two functions)              |
| $\mathbf{K}cx > x$      | (elementary cancellator, expresses a constant c as a function of x)               |

Also, let M be multiplication and A be addition.

Now, if we want to express  $(x+1)^2$  without variables we can write  $\mathbf{B}(\mathbf{W}M)(\mathbf{CA}1)$ . Now suppose we want to apply it to 3, i.e.,  $(3+1)^2$ . We would write  $\mathbf{B}(\mathbf{W}M)(\mathbf{CA}1)3$ . Here  $(\mathbf{W}M)$  corresponds to f in the  $\mathbf{B}$ -rule.  $(\mathbf{CA}1)$  corresponds to g and 3 corresponds to x. By carrying out the reduction we get  $\mathbf{W}M((\mathbf{CA}1)3)$ . This gives us another reduction - the  $\mathbf{W}$ -rule yielding  $M((\mathbf{CA}1)3)((\mathbf{CA}1)3)$ . Finally, we go inside the parentheses to get A31 that says Add 3 to 1.

One would never guess that  $\mathbf{B}(\mathbf{W}M)(\mathbf{CA}1)$  is an expression for  $(x+1)^2$ . Generally combinators are lacking in perspicuity. But this lack can be an advantage when exploring unknown territory. One can not bring their metaphysical prejudices into logic through the back door. And, it can lead to some profound surprises.

To express mathematics one needs an adequate set of combinators. Second, by logician's aesthetics, one desires the minimum adequate set. We will take the five basic combinators as such a set with which we can construct the combinator  $\mathbf{B}(\mathbf{B}(\mathbf{B}\mathbf{W})\mathbf{C})(\mathbf{B}\mathbf{B})$ . Call this combinator  $\mathbf{S}$ .  $\mathbf{S}$ 's rule is:

$$\mathbf{S}fgx > fx(gx)$$

Now we can form the  $\mathbf{Y}$  combinator.  $\mathbf{Y} = \mathbf{W}\mathbf{S}(\mathbf{B}\mathbf{W}\mathbf{B})$ .

The combinator  $\mathbf{Y}$  can be used to construct paradoxical expressions. The combinator  $\mathbf{Y}$  has the general property

$$\mathbf{Y}x = x(\mathbf{Y}x)$$

Letting N stand for negation,  $\mathbf{Y}N = N(\mathbf{Y}N)$ . Thus  $\mathbf{Y}N$  is equal to its own negation.

Originally  $\mathbf{Y}$  was called the "paradoxical combinator". It appeared that the basic fabric of mathematics is paradoxical. Many logicians, however, did choose to run away from the need to explain this circumstance by confining their work to so called "normal forms" of combinators which were known not to generate paradox.

Later the name was changed to "fixed-point combinator" since it associates with any X a  $\mathbf{Y}X$  which is a fixed point of X considered as a transformation. Then  $\mathbf{Y}$  became known as  $\mathbf{Y}_0$ , the first in a series of fixed point combinators. Next comes the Turing combinator  $\mathbf{Y}_1$ .

$$\mathbf{Y}_1 = \mathbf{Y}_0(\mathbf{S}\mathbf{I})$$

or in general

$$\mathbf{Y}_{n+1} = \mathbf{Y}_n(\mathbf{S}\mathbf{I}).$$

There is an unending hierarchy of fixed point  $\mathbf{Y}$ 's, and there are also other methods for constructing fixed point combinators.

Curry, the father of combinators letting Shoenfinkle be the grandfather, argued that paradoxical constructs should not be eliminated as meaningless as many would like to do. The many argue that propositions are either true or false, therefore we can not have paradox in a logic. Curry argued that if you have a category of propositions which must be true or false then paradoxical constructs are not in the category of propositions, but that does not make them meaningless.

Probably relational systems will need many categories with different characteristics. For example categories characterized by different combinations of illative (inferential) notions. Illative principles might involve functionality, modus ponens, equality, restricted generality, universality, negation, etc. Among our requirements will be means for constructing composite categories and rules for inferring the category of a composite expression when those of its components are known.

The basic idea is that  $\mathbf{Fab}$  is a category of maps (relations) from  $a$  to  $b$ , and if  $f$  is in  $\mathbf{Fab}$  and  $X$  is in  $a$ , then  $fX$  is in  $b$ . We can apply this to the combinators. For example, consider  $\mathbf{K}$ :

$\mathbf{K}xy = x$ . if  $x$  belongs to  $a$  and  $y$  belongs to  $b$ , then  $\mathbf{K}x$  belongs to  $\mathbf{Fba}$ ; since this holds for any  $x$  in  $a$ ,  $\mathbf{K}$  will belong to  $\mathbf{Fa}(\mathbf{Fba})$ . Thus we write  $\mathbf{Fa}(\mathbf{Fba})\mathbf{K}$  which means that the combinator  $\mathbf{K}$  is in the composite category  $\mathbf{Fa}(\mathbf{Fba})$ .

Similarly, for  $\mathbf{I}$ ,  $\mathbf{B}$ ,  $\mathbf{C}$  and  $\mathbf{W}$ :

$$\mathbf{FaaI}, \mathbf{F}(\mathbf{Fbc})(\mathbf{F}(\mathbf{Fab})(\mathbf{Fac}))\mathbf{B}, \mathbf{F}(\mathbf{Fa}(\mathbf{Fbc}))\mathbf{Fb}(\mathbf{Fac})\mathbf{C}, \mathbf{F}(\mathbf{Fa}(\mathbf{ab}))(\mathbf{Fab})\mathbf{W}$$

If we let  $\mathbf{J}$  stand for individual numbers and  $\mathbf{H}$  stand for propositions then the following composite categories can be seen in mathematics.

$\mathbf{FJJ}$ : descriptive functions of one individual, such as the square, the smallest prime factor, the factorial.

$\mathbf{FJH}$ : properties of classes of individual, such as primeness, oddness, being a square.

$\mathbf{FHH}$ : one-place propositional connectives, such as negation

$\mathbf{FJ}(\mathbf{FJJ})$ : descriptive functions of two individuals, such as the sum, product, power, etc.

$\mathbf{FJ}(\mathbf{FJH})$ : relations between individuals, such as equality, order, divisibility.

$\mathbf{FH}(\mathbf{FHH})$ : two-place propositional connectives, such as implication or conjunction

$\mathbf{F}(\mathbf{FJJ})\mathbf{J}$ : descriptive functions of descriptive functions, such as the maximum or minimum value, or the value of the function for a specific argument. (The definite integral in analysis, for fixed limits, would also be an example).

$\mathbf{F}(\mathbf{FJJ})\mathbf{H}$ : properties of descriptive functions, such as monotony

$\mathbf{F}(\mathbf{FJH})\mathbf{J}$ : descriptive functions of a class, such as the largest or smallest element, cardinal number (on one interpretation.)

$\mathbf{F}(\mathbf{FJH})\mathbf{H}$ : properties of properties, such as finiteness, cardinal number (considered as a property), quantifiers

$\mathbf{F}(\mathbf{FJJ})\mathbf{F}(\mathbf{FJJ})$ : operations converting one descriptive function into another, such as the finite difference.

$\mathbf{FJ}(\mathbf{F}(\mathbf{FJJ})\mathbf{H})$ : relations of an individual to a function, such as being one of its values.

$\mathbf{F}(\mathbf{FJJ})\mathbf{F}(\mathbf{FJJ})\mathbf{H}$ : relations between functions such as dominance

$\mathbf{FJ}(\mathbf{F}(\mathbf{FJH})\mathbf{H})$ : relations between an individual and a property such as possession of the property (i.e., membership in the class).

$\mathbf{F}(\mathbf{FJH})\mathbf{F}(\mathbf{FJH})\mathbf{H}$ : relations between properties, such as inclusion

$\mathbf{F}(\mathbf{FJ}(\mathbf{FJH})\mathbf{H})$ : properties of relations, such as symmetry

$\mathbf{F}(\mathbf{FJ}(\mathbf{FJH}))\mathbf{F}(\mathbf{FJ}(\mathbf{FJH}))\mathbf{H}$ : relations between relations, such as being the converse of.

$\mathbf{F}(\mathbf{F}(\mathbf{FJH})\mathbf{H})\mathbf{H}$ : properties of families of sets, such as being ordered with respect to inclusion.

There are also interesting examples pertaining to language. Though it is admittedly over simplified to suggest only two basic categories, we will do that for illustration. Assume  $\mathbf{N}$  for nouns and  $\mathbf{S}$  for sentences. Then there is a list such as the one above. We will not list them all. For example:

$\mathbf{FN}(\mathbf{FN}(\mathbf{FNN}))$ : the hyphen in "Brussels-Paris" express

$\mathbf{FSS}$ : negation or words expressing certain attitudes

$\mathbf{F}(\mathbf{F}(\mathbf{FNN})\mathbf{FNN})\mathbf{F}(\mathbf{FNN})\mathbf{FNN})$ : adverbs modifying other adverbs which in turn modify adjectives.

If we compared the full list of linguistic categories with the above from mathematics we would find some categories missing in mathematics since they are not used in mathematics.

----- end of **RELATIONAL SYSTEMS AND LOGIC** -----

## B. Probability, Entropy, and Plausible Inference (5)

1. R. T. Cox, *The Algebra of Probable Inference* (The Johns Hopkins Press, Baltimore, MD, 1961)

*"The Minimum Description Length Principle takes the sting out of Subjective Probability"*, Peter Grünwald, <http://www.linguistics.stanford.edu/Linguistics/llc/abs/grun/grun.html>

2. E. T. Jaynes, *Probability Theory: The Logic of Science*, <http://omega.albany.edu:8008/JaynesBook>

Probability, as we have previously defined it in the general case, is a relation between "order" and "disorder" (the latter as represented in the "possible") which orders the disorder. Therefore, to maximize a probability is to maximize the ordering of specific disorder. This is explicitly what is required for experiential consistency in theory (and model) construction. Moreover, in that the systemic probability is a function of the subsystemic probabilities, to maximize the former means to do so with respect to the subsystemic probabilities; hence, we have the following "maximum systemic probability principle" (MSPP) and its special case the "maximum entropy principle" (MEP):

MSPP(MEP): Choose those subsystemic probabilities which maximize the systemic probability (e.g. the entropy) subject to all given relational constraints.

In past work on spatial-temporal relational systems, we have explicated two classes of realizations of the MSPP, the first dependent on "one-(time) point variations" and the second on "multi-(time) point variations". Applications of these two classes respectively include probabilistic decision systems for choosing initial ("prior") probabilities and variational principles for generating and/or resolving probabilistic dynamics. Specific applications in the resolution of probabilistic dynamics include stability analysis (equilibrium; stationarity; limit cycles), reversibility, conservativeness, and control. As a general foundation for the design of specific empirical (statistical) methodologies we have the following proposition:

*Proposition 0*: Since it can be shown that the MEP generates a unique maximum, it follows that the choice of subsystemic probabilities so obtained are also "optimal" relative to whatever is known as expressed in the relational constraints.

Hence we have constructed the foundation for a general theory of probable inference, (including such as probabilistic pattern generation/pattern recognition), one form of which we call "optimal entropy inference" (OEI). Various developments of OEI have taken place in the past fifteen years together with numerous applications (2-12).

### 3. C. S. Peirce

*"Futures Voice: Intelligence Based on Pragmatic Logic"*, Eugene Pendergraft, Creative Intelligence Incorporated (June 1993)

*"Dynamical Models in Semiotics/Semantics: Catastrophe Theoretic Semantics: Towards a Physics of Meaning"*, Franson D. Manjali, <http://www.univie.ac.at/Wissenschaftstheorie/srb/cyber/manout.html>

## C. Control/Stability (Instability) Formalisms

*"Dynamical Symmetries: The Areas of Mathematical Synthesis Between Chaos Theory (Complexity), Fractal Geometry and the Golden Mean: an architectural approach"*, Nigel Reading [ccdva@westminister.ac.uk](mailto:ccdva@westminister.ac.uk)

Deriving from the above work we have initiated the development of a general formalism for control/stability (-instability) analysis based on the MSPP. This latter appears (see RS-5 or RS-7) as the relation R' between R (the actional selection of a subset of subsystemic probabilities (S') from the set of the same (S)) and the systemic probability R" (which interrelates the "actual" (i.e., the relational constraints, S") to the possible" (represented by the formal system of subsystemic probabilities, S')). Via our general formalism, we have been able to unify conceptually the three extant methods of stability (instability) analysis, namely - the persistency principle of Kikuchi, the entropy production procedure of Prigogine, and Liapunov's direct method.

This work on probability and control/stability is included herein specifically because we are using the mathematical method of "optimal entropy inference," taken as an approximation to an RR-system, as a metaphorical guide in the development of specific relational life sciences.

## Relational Sciences

(SPECIFIC CLOSED IMAGE SYSTEMS): (2)

As a partial summary of our presumptions, consider the following propositions:

*Proposition 1:* Ignoring initially the omnipresent problem of "closure" (resolvable through self-relation), our present choice of a cosmichaology requires the use of each of the general SS-, SR-, and RR- systems as realized through specific *S*, *I*, and *IaR*.

*Proposition 2:* In particular, it is postulated that physical (non-living) systems may be adequately represented by SS-systems whereas life systems necessitate RR-systems for consistent representation. Moreover, SR-systems are postulated to be the minimal form required for representing "observation-measurement."

*Proposition 3:* In that SS-systems with *S*-relations have dominated human symbol systems, we continue an "emphasis" but not exclusive dependence on SSS' in the present stage of relational systems development, especially to carry on the historical importance of spatial temporal relations.

The theoretical implications of our philosophical foundations derive, in part, specifically from these propositions. Consonant with Proposition 3 is the observation that all extant cosmologies recognize both notions of the "whole" (system) and its "parts" (subsystems) and that both notions are used in representing experience of physical and living systems. Hence every experience is represented through the conjoint use of systemic and subsystemic symbols and accordingly, we also have the following presumption as a proposition:

*Proposition 4:* There are foundationally three and only three classes of descriptors necessary for theory construction. They are: one *systemic descriptor for the interrelation of a system with the environment* (that which the system is not); two *subsystemic descriptors, one for the intersubsystemic relations and one for the interrelation of the subsystems with the environment*.

These three classes of descriptors are generally concretized as follows: one systemic descriptor which is formally called the "field" is theoretically quantified via "energy"; two subsystemic descriptors, which are formally called "particle" descriptors, are theoretically characterized as per the atomic characterization in the taxonomical outline of Table 1.

From this Table it can be seen that the "threeness" of the abstract level is preserved in the experiential level. This is most easily understood by analogy with the process of locating a vector in a three-dimensional coordinate system. Regardless of how one rotates and/or translates this coordinate system relative to the original, it still takes three numbers to locate the vector. Obviously the numbers are different for different transformations of the coordinate system. Likewise, the experiential level systems, being only formally redefined abstract level systems, must preserve the essential threeness of the former.

It is a "fact" of physical science that "laws of nature" in some instances are sufficiently consistent with experience when expressed in terms of, either one or the other but not necessarily both, the systemic and subsystemic descriptors. In these cases, the interrelation of these descriptors is usually given only definitionally. Consider, for example, Newton's second law,  $F=ma$ .

Here the systemic descriptor, which is quantified in the field construct, "force", is given as a definitional identity in terms of a spatial-temporal relation (acceleration) on a subsystemic descriptor, here quantified in the particle construct, "mass". It is our contention that, whereas this type of formulation is adequate for describing physical systems, life systems require an R03 formulation. Since our choice of cosmichaology explicitly necessitates the use

of all three classes of descriptors regardless of whether the relevant laws of nature are RO1 or RO3 in form, we are led to the formal identifications collected in Table 2.

To reemphasize a critical point, it should be kept in mind that whereas physical "atoms" are adequately representable through the subsystemic (particle) descriptors alone, for life systems there is no meaning in the concept of "atom" independent of the concept of "field". At first this appears confusing since our experience in physical science leads us to identify particles via subsystemic descriptors. In fact, however, even in physical science the process of measurement-observation frequently depends upon a field/particle coupling as in the determination of mass via weight (force). Yet in this case experiential consistency is adequately achieved via a simple identity or definitional (RO1) interrelation of field and particle.

As a consequence of all of the above, we have introduced the following general form as a representation for life processes:

$$\text{RS-8:} \quad \begin{array}{l} \text{sSRS} \\ \text{SR'S} \\ \text{sSR"sS'} \end{array}$$

sS and sS' represent prebionic or prepsychonic or presocionic particles, S corresponds to the "environment", S is the field associated with the appropriate particle, and R, R', R" are specific relations. That is, there is some particle aggregate in which the "particle-other particle relations" (sSR"sS') and "particle-environment relations" (sSRS) are uniquely integrated in an R03 system via the "field-environment relations (SR'S).

There are two critical points in the above discussion which should perhaps be elaborated upon before proceeding with a more detailed development of the two levels of major concern herein - the bionic and psychonic. Firstly, recall that in the preceding outline of a general format for relational theory construction, we touched briefly on the process of "next-level" construction. This was identified as a method for "re-solving" the inconsistency (indeterminacy) in a given theory level. Let us suppose, for example, that we are considering the mechanics of the interaction of electrons, protons, and neutrons taken as atoms within a nuclonic level. For certain observable phenomena, for example spectral radiation, there are specific stable aggregates of these particles which when considered themselves as entities, reduce the inconsistency of the mechanical theory in representing those phenomena. These aggregates then become possible next-level atoms, in this example, chemons (H, He, Li, Be, B, etc.).

Similarly, for biophysical and biochemical phenomena, the relativistic quantum electrodynamical treatment of interacting chemons (and/or molecules and/ or macromolecules) becomes an inconsistent representation of the underlying biosystem. To resolve this indeterminacy, we pass from the chemonic to the bionic level.

"The assumption is justified of supra mechanical stability of stationary states in atomistic or discrete living units, which we refer to as bions. (Bions are not equivalent to cells. An organized cell is not a bion, but is composed of bions. Bions are a more fundamental living unit than cells.)" (13)

"The essential feature is that the bion, which must be treated as a unit because of the underlying indeterminacy of molecular motion, provides a rational basis for the complete descriptive connection of the two minimally essential sets of living processes, metabolism and reproduction." (14)

It is imperative to note, however, that in passing from the chemonic to the bionic level, as contrasted with passing from the nuclonic to the chemonic level, not only is there required a change in the particulars of the descriptor, but the form of the descriptor itself must be changed from R01 to R03. This, of course, is the central hypothesis of the relational life sciences.,

Second, it should be observed that in a multi-level theory each level has its own qualitatively different "atoms" and "field". Moreover, since each level is a component of a hierarchy, each level partially determines and is determined by others. However, by definition each level is a next-level and as such no level is completely determined by nor completely determines any other. Two conclusions of relevance herein follow. Each field is at least partially unique. And life systems are not completely reducible to physical systems. This latter does not imply that there are

not biophysical/biochemical processes involved in life systems. It only denies that such processes identically determine life processes.

#### A. Relational Physical Systems Theories

*"Ons: An Algebraic Foundation for Being and Time, Explaining the Emergence of Clifford Algebra Structure"*, Ben Goertzel, <http://goertzel.org/ben/OnsAlgebra.html>

##### 1. Formons

*"Ons: a theory of truly elementary particles explaining the emergence of structure from void in physics and psychology"*, Ben Goertzel, <http://goertzel.org/ben/ons.html>

#### B. Relational Biosystems Theory: Some Initiating Considerations (13; 15 - 19)

To develop a theory of biosystems as identified in Table 2 and as taxonomically outlined in Table 1, there are three classes of descriptors which must be identified. One, of course, is the systemic descriptor, the "biofield". The remaining two, the sub-systemic descriptors, must be abstracted from the two basic experiential classes of relations in biosystems, metabolism and reproduction. The following quote may assist in the phenomenological clarification.

"Viruses are referred to as sub-bionic particles. This terminology is used because viruses do not qualify as bions under the minimal capability requirements of reproduction and metabolism. They require other bions or living cells for metabolism. Most generally, viruses are analogous to subatomic particles of atoms. As Lwoff (1966) first reported some viruses, such as lysogenic bacteriophages, disappear into the genome of a living cell only to appear unpredictable at later times. Oncogenic viruses are passed in tissue culture without evidence. What viruses do in living cells or bions is analogous to what alpha particles do when they are bombarded into nuclei of atoms. The nuclei of atoms change energy states and eject some similar particle. Rickettsia are of bionic size, have a single plasmic envelope, but require a cellular environment for growth. They may be interpreted as analogous to chemical free radicals which are trapped in a frozen matrix. They seem to be "parasitic" or degenerate bions. Both viruses and rickettsia exhibit infectivity or capability for entrance into cells, which may be very specific." (13)

As in the case of physicochemical systems, where the initiating experiential relations of "weight" and "affinity" are transformed into "mass" and "charge" for the continued (observable  $\longrightarrow$  abstract sub-level) theory construction, metabolism and reproduction must be formally transformed into appropriate abstract sub-level constructs. For the record we note that, again in analogy with the physicochemical case, there are exactly two experiential relations given from which exactly two abstract sub-level descriptors are to be derived. To exemplify this process of abstraction (observable  $\longrightarrow$  abstract sub-level) we include here the initial definitions of our posited descriptors. (15)

*Definition 1: Metabolism* is the interrelation of prebionic (chemonic-molecular-macromolecular) particles with the environment (especially the nutritive environment), a consequence of which is the selective organization of the latter into replicas of the prebions. This would be expected to correspond to a primitive form of the descriptor for subsystem-environmental interrelations.

*Definition 2: Reproduction* is the interrelation of the prebions among themselves, the consequence of which is bionic (and all derivative, e.g., organismic) replication. This would then be expected to correspond to a primitive form of the descriptor for subsystem interrelations.

As indicated in RS-8 above, neither reproduction nor metabolism exist independently as SS-systems, e.g., as spatial-temporal (dynamical) processes, but rather as field-interrelated RR-systems.

Finally, we also include the following excerpt from our work on the evolutionary origins of life in order to indicate the role of the maximum systemic probability principle (and optimal entropy inference) as introduced in the preceding section on Relational Formalisms.

"In the process of material evolution the following systemic relations must emerge in specific form for matter to manifest itself as living. It should be observed that these conditions represent direct specializations of the previously specified philosophical presumptions, a characteristic feature of Relationism. This underscores the rather obvious fact that the fundamental experiential and theoretical questions concerning life are inextricably interwoven with the foundations of philosophy at the level of the living inquirer.

#### **(A) IMAGE CARRIER**

Of central importance to the emergence of life is the evolution of a system whose relation to other systems is that of a carrier of an image of the interaction between the carrier and the other systems. This is also recognizable as the concept of record. Via the interaction of a system with the carrier the image can be "read out" to alter the relational structure of the system. A feature of the image of essential import is its persistence, relative to that of the actions which gave rise to it and to that of the interactions the carrier will undergo with other systems. Moreover, it has to be noted that the carrier may hold more than one image, thus leading to various possible relational impressions on an interacting system.

#### **(B) FORMAL DECISION SYSTEM**

In order for a system to effectively use the image carrier, it is necessary that there evolve a decision system ("pair-relational" or "decisional" dynamics). In the formal representation of such, all decision rules must be expressible without arbitrariness (i.e. without recourse to a metalanguage) in the system. This decision process is also termed selection, classification, recognition, choice, etc., in other work.

As opposed to the process of employing the maximum systemic probability principle only as a method of generating prior subsystemic probabilities given certain expectation value constraints, we here recognize it as a natural decision (variational) process for constructing a systemic dynamics, specifically a life-dynamics. The difference between this hierarchy and that including thermomechanics, which can be similarly constructed and hence exhibits a similar evolutionary chain, resides in the role of the expectation value constraints. In thermomechanics they are used only formally and are admitted externally. In the life dynamics they are formally considered to enter physically via internal image carriers." (16)

In concluding this subsection it might be worth noting that the intuitive recognition of the necessity of a relational interdependence of the concepts of "atom" and "field" in biology is now the common basis for holistic criticisms of reductionist biology; that is, if a biosystem is analyzed into its components, life is destroyed! Finally, we report here that a bion/biofield experiment has been designed to test our conjectures. The necessary instrumentation has been largely identified and a laboratory is now being designed.

#### **C. Relational PsychoSystems Theory: Some Initiating Considerations**

A psychon as identified in Table 2 and characterized in Table 1 is an atom of organismic behavior (or biosystem action). The phenomenological background for this characterization is partially indicated by the following excerpt.

"As a specific projection, attention is focused upon time-independent phenomena which have been the province of synaptic neurophysiology and conditional reflexes of psychobiology and upon time-dependent phenomena which correspond with these, called facilitation in synoptic neurophysiology and learning or establishment and modification of conditional reflexes in psychobiology.

Description of these time dependent and time-independent classes of phenomena is unified under quantal explication in terms of "mnemic microstates", which are examples of retroverted nervous processes (we have named them "retroverted" processes to signify that they have turned back to a quantized mode to perform a particular function in an organized hierarchy) or "atomic entities".

Quantal description predicts and explains other retroverted nervous processes, such as global psychic states. Deterministic neurophysiology and psychobiology has not yet been able to explain these emergent processes.

The present paper is the third in a series. The first dealt very generally with the implications of Heisenberg indeterminacy of molecular motion at synapses in the nervous system. (20) The second paper made the point that in view of mechanical indeterminacy at any major hierarchical level of nervous function, as exemplified by the synapse, the brain cannot be mimed by the most general Turing machine, i.e. most universal calculating engine. (21)

These considerations require that a new mode be introduced in describing nervous function if the description is to be non-dualistic with that of physics and chemistry. Since a necessary consequence of mechanical indeterminacy is quantization, an objective of the present paper is to align some basic synaptic neurophysiological and psychobiological concepts with the proper descriptive mode which we know of quantized systems. This will help to make clear the phenomenological status of the conditional reflex.

A definite acknowledgement is made here that along with the synapse there are other major functions in which molecular motion is very likely indeterminate in the nervous system. The following discussion is not to be construed as "building a brain or nervous system out of synapses". This would incorrectly omit from necessary consideration other indeterminate nervous functions such as DC potential generation, glial cell-neuron interaction, blood-brain barrier activity, axonal protein flow, etc." (14)

One of the more promising endeavors in the empirical study of psychosystems is the recently summarized research on emotions, called the science of sentics. (22) From Table 1, we see that emotions are a direct form of psychonic aggregate. The most important aspect of this study of sentics, from our perspective, was the experimental verification of the existence of a specific class of psychons, called "actons". An acton in this work is described as a unit of preprogrammed voluntary movement and its decision. We take this to be a principally reactive psychonic action effected essentially through states of the aggregate form, "thought" (see Table 1). An "expressive acton (E-acton)" is one which is then further modulated in expression through a specific emotional (sentic) state. And finally, there is a spatial-temporal form with a clear beginning and end, which can be expressed by various motor outputs, and which communicates a specific emotion state; this spatial-temporal form is governed by a brain program specific for an emotion (sentic) state and is called its "essentic form". This latter, interpreted within relational psychosystems theory, would be a "mind (nerve-brain/motor) state".

Of course there is no direct consideration in this work on sentics of a relational (RO3) formalization interrelating these actons in a psychofield. The ingenious experimental methodology developed therein, however, has clearly opened a new empirical frontier in consonance with the psychonic postulates of relational psychosystems theory.

*The foregoing is a sample of a form to be continuously expanded in substance (via a to-be-identified website), including expansion into the following.*

## **Relational Humanities**

(SPECIFIC OPEN IMAGE SYSTEMS)

## **Relational Arts**

(GENERAL OPEN IMAGE SYSTEMS)

## **Relational Theology**

(SELF-RELATIONAL IMAGE SYSTEMS)

## **Relational Image/Action Systems**

(IMAGES OF IMAGE ACTUALIZATIONS)

# RELATIONAL ACTION SYSTEMS

## **SOCIETAL**

(WHOLE ACTION SYSTEMS)

## **Interrelation**

(FACILITATION OF GROUP FORMATION (INCLUDING ORGANIZATIONAL DEVELOPMENT))

## **Research**

(CREATION OF RELATIONALSYSTEM(S))

## **Technology**

(APPLICATION AND INTERNAL EVALUATION OF SYSTEMS OF HUMAN EXTENSION)

## **Re-Creation**

(EVALUATION OF SYSTEMS OF HUMAN EXTENSION AGAINST OTHER ACTUALIZATIONS)

## **Religion**

(EVALUATION OF SYSTEMS OF HUMAN EXTENSION AGAINST IDEALIZED SYSTEMS)

## **Education**

(FACILITATION OF PERSONAL EXTENSION)

## **Relational Cosmichaology: A Concluding Note**

Finally, we should note that in a relational cosmichaology, each of the levels (... nuclonic,... bionic,... autonic,...)is itself an atom (cosmichaon) in a cosmichaotic field. This is a critically important point in resolving multilevel fields.

In addition to the direct inter-field interactions between levels, for example, the chemonic (electromagnetic and gravitational) influence on biofields, there is also the possibility of indirect inter-field interactions between levels via the mediation of the cosmichaotic field.

Obviously, physical & life fields are mutually interrelated. However both are also subsumed in the cosmichaotic field. Hence a physical effect carried in the cosmichaotic field may also be presenced thereby in a life field. And conversely!

## References

1. L.M. Bianchi J.R. Hamann, "Education: Toward a Relational Synthesis", paper distributed through the Peripatetic College (E), State University of New York at Buffalo (1969).
2. J.R. Hamann, Relational Systems: Introduction: A monograph first distributed through "Symbolic Relational Systems", Center for Theoretical Biology, State University of New York of Buffalo. (1968).
3. J.R. Hamann & L.M. Bianchi, "Stochastic Population Mechanics in the Relational Systems Formalism: Volterra-Lotka Ecological Dynamics Theoret. Biol. 28, 175 (1970).
4. L.M. Bianchi & J.R. Hamann, "The Relational Formalism in Multicomponent Biosystems: On the interrelation Between Statistico-Mechanical and Stochastic Theories (or Models)", Math Biosciences 5, 277(1969).
5. J.R. Hamann, "Probable Inference: Probable, Entropy and Inductive Logic". First draft distributed under the title, "On the Foundations of Generalized Probability", through the Theoretical Chemistry Group, New York University (1966).
6. J.R. Hamann, J. C. Lamb and J. P. Isaacs, "On the Multiple Realizations of the Maximum Systemic Probability Principle", Quart. Bull. Center Theoret. Biol. 5, 197 (1972).
7. J.R. Hamann and L.M. Bianchi, "A Note on the Relations Among Prior Probabilistic Decisions, The Path Probability Method, Optimal Entropy Inference and Statistical Mechanics", Progress Theoret. Phys. 42, 982 (1969).
8. J.R. Hamann, "A Note on Optimal-Entropy-Inference in the Statistical Mechanics of Time-dependent Phenomena", Nuovo Cimento Suppl. 6, 1102 (1968).
9. J.R. Hamann, "A Unified (Relational) Probabilistic Foundation Underlying Both the Equilibrium and Nonequilibrium Aspects of the Phenomenological Level of the Theory of Quantum Fluids", paper distributed through the Theoretical Chemistry Group, New York University (1967).
10. J.R. Hamann, "Stochastic Theory of Chemiluminescent Systems. I. Optimal-Entropy Formulation in a Markov System", *ibid*(1966).
11. J.R. Hamann and W. Giordano "On the Constrained Minimum Energy Method and the Inferential Foundations of Semiempirical Quantum Theory", paper distributed through "Theoretical Pharmacology", Center for Theoretical Biology State University of New York, at Buffalo (1968).
12. J.R. Hamann and W. Giordano "On the Foundation of the Notion of Electronegativity", *ibid* (1969).
13. J.P. Isaacs, and J.C. Lamb, Complementarity in Biology (Baltimore, The John Hopkins Press, 153-157, 1969)
14. J.P. Isaacs and J.C. Lamb, "Quantum Description of Synaptic Nervous Function (The Phenomenological Status of the Conditional Reflex)", Conditional Reflex 7, 139 (1972).
15. J.R. Hamann & J.C. Lamb, "Relational Biosystems Theory: Formal Foundations of the Bion / Biofield Hypothesis," distributed by "Symbolic Relational Systems", Center for Theoretical Biology, State University of New York at Buffalo (1973).
16. L.M. Bianchi and J.R. Hamann, "The Evolutionary Origin of Life: Preliminary Considerations of Necessary and (Possibly) Sufficient Conditions", J. Theor. Biol. 28, 489 (1970).
17. J.R. Hamann and L.M. Bianchi, "On the Evolutionary Origin of Life and the Definition and Nature of 'Organism': Relational Redundancies". Abstracted in the Proceedings of the Symposium by Correspondence: Biogenesis, Evolution and Homeostasis, ed. A. Locker (Springer-Verlog, 1970).
18. J.R. Hamann, "On the Fundamental Intersystemic Relation for Biosystems", Quart. Bull. Center Theoret. Biol. 4, 59, (Jan. 1971)
19. L.M. Bianchi and J. R. Hamann "Relational Hierarchies in Biosystem Theories", in Mathematical Aspects of Life Sciences, ed. M. T. Wason (Queen's Paper in Pure and Applied Mathematics No. 26, Queen's University, Kingston, Ontario, Canada.) Presented at Symposium on Mathematical Theories in the Life Sciences", Kingston, Ont., June 12 - 13, 1969.
20. J. C. Lamb and J. P. Isaacs "Indeterminacy, the Synapse, the Mnemic Microstate, and the Psyche, Conditional Reflex, 4, 1-5 (1969).
21. J. C. Lamb and J. P. Isaacs, "Quantization of Molecular Motion at the Synapse and its Consequences as Contrasted with the Generalized Turning Machine", Conditional Reflex 7, 115 (1972).
22. M. Clynes, Sentics: The Touch of Emotions (Anchor Press Doubleday, Garden City, New York, 1977).

## ATTACHMENTS

Tables:

1. Theoretical/Experiential Taxonomy of Scientific Systems(beginnings)
2. Life Systems Identifications

Exemplars:

1. Interrelated Systems vs. Interrelated Relations
2. Whole/Part Interrelations
3. Fields
4. Atoms

Relational Systems: Annotated Outline

**Table 1**

**THEORETICAL/EXPERIENTIAL TAXONOMY OF SCIENTIFIC SYSTEMS**

| ABSTRACT LEVEL  | PARTICLE AGGREGATES   | EXPERIENTIAL OBSERVABLE LEVEL          |
|---|---|--|
| 1. FORMOSYSTEMS<br>Formofield<br>Formons (Characterized by)<br>Integration (absorption)<br>Differentiation (emission) | ?   | ?                                      |
| 2. NUCLEOSYSTEMS<br>Nucleofield<br>Nuclons (characterized by)<br>Spin<br>Symmetry                                     | Matter Particles<br>(aggregates of nuclons)<br>Interactions<br>(aggregates of matter particles) | ?                                      |
| 3. CHEMOSYSTEMS<br>Chemofield<br>Chemons (characterized by)<br>Mass<br>Charge   | Molecules<br>(aggregates of chemons)<br>Macromolecules<br>(aggregates of molecules)             | Solids<br>Liquids<br>Gases             |
| 4. BIOSYSTEMS<br>Biofield<br>Bions (characterized)<br>Metabolism<br>Reproduction                                      | Prokaryotes<br>(aggregates of bions)<br>Eukaryotes (symbiotic aggregates of prokaryotes)        | Plants<br>Animals<br>Fungi             |
| 5. PSYCHOSYSTEMS<br>Psychofield<br>Psychon (characterized by)<br>Reaction<br>Creation                                 | Thoughts/Emotions<br>(aggregates of psychons)<br>Mind<br>(aggregates of thoughts/emotions)      | Autonomic<br>Subconscious<br>Conscious |
| 6. SOCIOSYSTEMS<br>Sociofield<br>Sociions (characterized by)<br>Symbolization<br>Communication                        | Groups<br>(aggregates of psychons)<br>Societies<br>(aggregates of groups)                       | Families<br>Organizations<br>States    |
| 7. AUTOSYSTEMS<br>Autofield<br>Autons (characterized by)<br>Software ___?<br>Hardware ___?                            | Computers<br>(aggregates of autons)<br>Autognomes<br>(aggregates of computers)                  | ?                                      |

## Table 2

### **LIFE SYSTEMS IDENTIFICATIONS**

- 1: **LIFE SYSTEMS** are those systems which can only be consistently imaged via the integration of all three classes of fundamental theoretical descriptors in single RO3 systems.
- 2: A **BIOSYSTEM** is a life system whose subsystemic descriptors represent chemonic (-molecular-macromolecular) systems.
- 3: A **BION** is an atomic biosystem.
- 4: A **PSYCHOSYSTEM** is a life system whose subsystemic descriptors represent bionic systems.
- 5: A **PSYCHON** is an atomic psychosystem.
- 6: A **SOCIOSYSTEM** is a life system whose subsystemic descriptors represent psychonic systems.
- 7: A **SOCION** is an atomic sociosystem.

## EXEMPLAR ON INTERRELATED SYSTEMS vs. INTERRELATED RELATIONS

*"The basic oneness of the universe is not only the central characteristic of the mystical experience, but is also one of the most important revelations of modern physics. It becomes apparent at the atomic level and manifests itself more and more as one penetrates deeper into matter, down into the realm of subatomic particles. The unity of all things and events will be a recurring theme throughout our comparison of modern physics and Eastern philosophy. As we study the various models of subatomic physics we shall see that they express again and again, in different ways, the same insight - that the constituents of matter and the basic phenomena involving them are all interconnected, interrelated and interdependent; that they cannot be understood as isolated entities, but only as integrated parts of the whole."*

Excerpt from Fritjof Capra, *The Tao of Physics* (Bantam Books, 1977), pp. 117 - 118.

Both the INTERRELATION OF SYSTEMS and the INTERRELATION OF RELATIONS forms are referred to in this quote. In the first case "the constituents of matter" (i.e., systems) are seen as "interconnected, interrelated and interdependent" (each of these names refers to an instance of our general use of the term, interrelation). Obviously, the "interconnections of the constituents of matter" is simply an expression of the well-understood form of INTERRELATED SYSTEMS. More importantly, however, and without significant explication, the author has marvelously noted the existence of INTERRELATED RELATIONS via the expression of "interconnected phenomena." In another example from the same book we have the following.

*"In Buddhism, the image of the cosmic web plays an even greater role. The core of the AVATAMSAKA SUTRA, one of the main scriptures of Mahayana Buddhism, is the description of the world as a perfect network of mutual relations where all things and events interact with each other in an infinitely complicated way." ibid. pp. 125 - 126.*

Again this author has observed that both "things" (systems) and "events" (relations) "interact" (interrelate), an observation which is in contrast to the prevailing view that only things interact.

As a concluding example we turn to the following quote from a Buddhist scholar.

*"The Buddhist does not believe in an independent or separately existing external world, into whose dynamic forces he could insert himself. The external world and his inner world are for him only two sides of the same fabric, in which the threads of all forces and of all events, of all forms of consciousness and of their objects, are woven into an inseparable net of endless, mutually conditioned relations."*

Excerpt from Lama Anagarika Govinda, *Foundations of Tibetan Mysticism*. (Samuel Weiser, 1974), p. 93.

Quite simply the reference to "mutually conditioned (i.e. interrelated) relations" is an expression of the form of the INTERRELATION OF RELATIONS.

## EXEMPLAR ON WHOLE/PART INTERRELATIONS

It is the existence of the "whole as no-thing", the essence of which is **INTERRELATED RELATION**, which is the critical foundation principle of Relational Systems as reviewed herein.

*"The hologram says that the essence of the whole is that it is whole. This is what it tells us immediately: the whole is whole. If we had begun our discussion of the whole with the statement that the whole is whole, it would have seemed to be either trivially pedantic, so obvious as to be not worth mentioning, or just plain vacuous. But the optical case shows us immediately that this statement, far from being a trivial tautology, is saying the primacy of the whole. It says the primacy of the whole which can be seen by breaking the hologram plate. It says that the whole is ontologically distinct; it is a fundamental state which is uniquely itself and single in its own nature. From itself it cannot be conceived as being dependent upon anything other than what it itself is.*

*The essential irreducibility of the whole is such that it would seem inconceivable at first that there could be any sense in which the whole could be said to have parts. This inconceivability arises in some degree from the strength of the statement that the whole is whole; but it also arises from an unnoticed preconception of the relation between parts and whole, a preconception which is such as to deny effectively the primacy of the whole. We are accustomed to thinking of going from parts to whole in some sort of summative manner. We think of developing the whole, even of making, the whole, on the practical basis of putting parts together, making them fit, plugging gaps, balancing and stabilizing, and so on. Thus we see the whole as developing by 'integration of parts'. But this way of thinking places the whole secondary to the parts, though usually we do not notice this. It places the whole secondary because taken by itself it necessarily implies that the whole comes after the parts. It implies a linear sequence: first the parts, and then the whole. Thus it implies that the whole always comes later, later than its parts.*

*Faced with the primacy of the whole, as manifested by the optical hologram, we may want to reverse the direction of the way of thinking of the whole. This we would do if we thought of the parts as being determined by the whole, defined by it, and so subservient to the whole. Indeed, just such an approach has been common for some time in the study of industrial organizations. But this is not the true primacy of the whole. It puts the whole in the position of a false transcendental which would come earlier than the parts, and so would leave no place for authentic parts. Parts are essentially redundant in this approach to the whole, their role being no more than a useless pretence to an autocratic whole that is statically frozen in the vice of its own self-determined authority. When there is no true place for parts there can be no question of development.*

*Insomuch as the whole is whole it is neither earlier nor later. To say that the whole is not later than the part is not to say that we do not put parts together. Of course we do -- consider the action of writing, for example. But the fact that we often put parts together does not mean that in so doing we put the whole together. Similarly, to say that the whole is not earlier than the parts is not to deny the primacy of the whole. The primacy of the whole is in that it is a unique ontological state. So to assert the primacy of the whole is not to maintain that it is dominant in the sense of having an external superiority over the parts.*

*We can see the limitation of these two extremes with regard to the whole if we look at the action of writing. We put marks for words together on a page by the movement of the pen to try to say something. What is said is not the resultant sum of the marks, nor of the words which they indicate. What is said is not produced automatically by the words adding together as they come. But equally, we do not have what is said fixed and finished in front of us before it is written. We do not simply copy what is already said. We all know the familiar experience of having the sense that we understand something and then finding that it has slipped away when we try to say it. We seem to understand already before saying, but are empty. What is brought into expression is not ready-made outside of the expression. But neither is expression an invention from a vacuum.*

*The art of saying is in finding the 'right parts'. The success or otherwise of saying, and hence of writing, turns upon the ability to recognize what is a part and what is not. But a part is a part only inasmuch as it serves to let the whole come forth, which is to let the meaning emerge. A part is only a part according to the emergence*

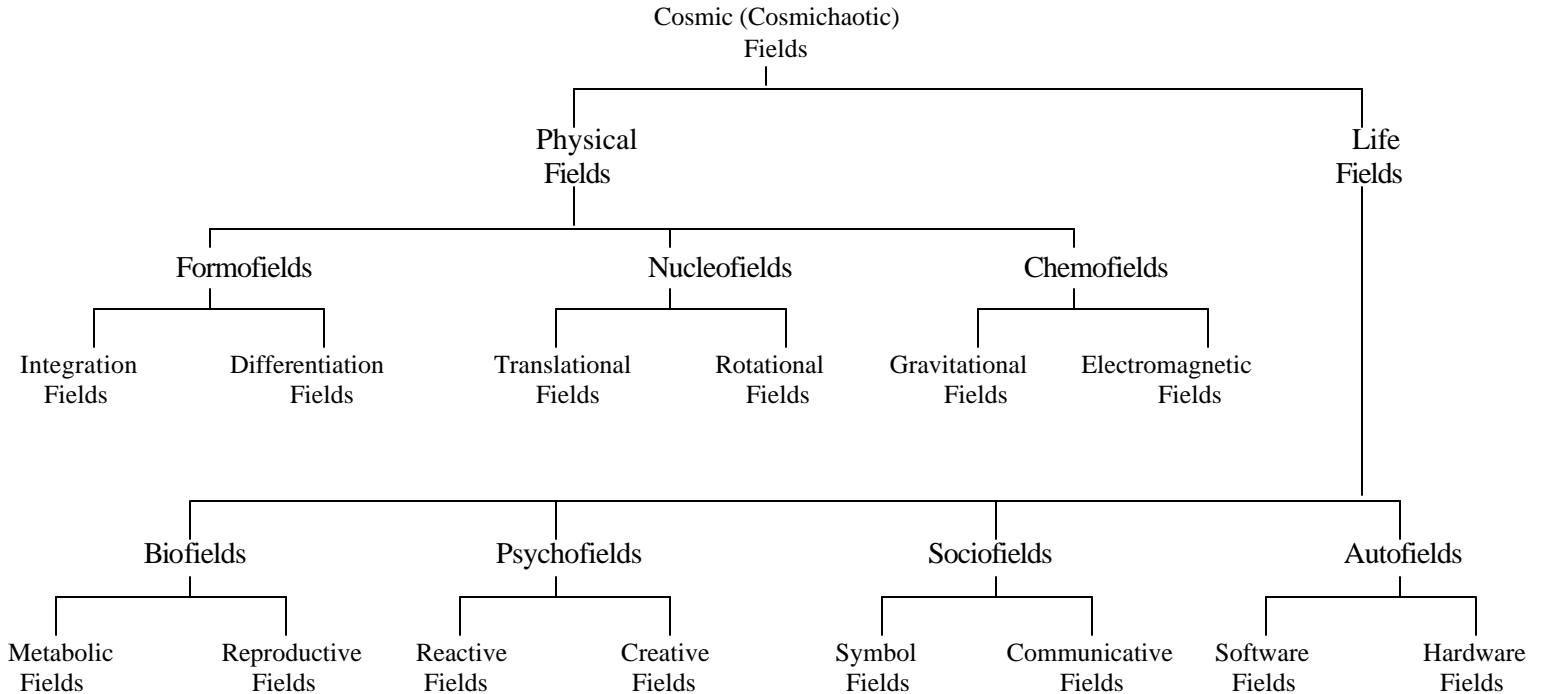
*of the whole which it serves; otherwise it is mere noise, and hence lost. But the whole does not dominate, for the whole cannot emerge without the parts. The hazard of emergence is such that the whole depends on the parts to be able to come forth, and the parts depend on the coming forth of the whole to be significant instead of waste. Thus the recognition of a part is possible only through the coming to presence of the whole.*

*We cannot know the whole in the way in which we know things because we cannot recognize the whole as a thing. If the whole were available to be recognized in the same way as we recognize the things which surround us, then the whole would be counted among these things as one of them. So we could point and say "here is this" and "there is that", and "that's the whole over-there". If we could do this we would know the whole in the same way that we know its parts, for the whole itself would simply be numbered among its parts, so that the whole would be outside of its parts in just the same way that each part is outside of all the other parts (look how each word of a sentence is outside of all the other words of that sentence). But the whole comes into presence within its parts, so we cannot encounter the whole in the same way as we encounter the parts. Thus we cannot know the whole in the way that we know things and recognize ourselves knowing things. So we should not think of the whole as if it were a thing (but we always do!) for in so doing we effectively deny the whole inasmuch as we are making as if to externalize that which can presence only within the things which are external with respect to our awareness of them. (Consider how the meaning of a sentence is not another word of the sentence.)"*

Henri Bortoft, *"The Whole: Counterfeit and Authentic"*, *Systemantics* 9, No. 2. Pp. 50-56 (Sep. 1971)

## EXEMPLAR ON FIELDS

A "field" is a descriptor for the "whole" quantifiable as "energy". The problems of research on fields are the usual ones of detection, identification and characterization (including mutual discrimination), modification, storage (preservation/maintenance), transmission and generation (synthesis). The following chart suggests the complexity of this problem.



By way of example, consider the possible forms of "life field detectors." Obviously they generally can be either physical (non-living) systems or life systems. Regardless of which, the crux of the detection process is one of resolution. For example, how is a metabolic biofield distinguished from the electromagnetic field of biophysical-biochemical components. The dilemma is that, if, for instance, an electromagnetic detection system is used in detecting life fields, how does one ascertain whether the phenomenon observed is itself physical or living? The answer, of course, rests on the presumptive origins of the specific theory being tested.

Our approach implies a multilevel theory deriving from next-level construction as a method of resolving intra-level indeterminacy. Hence our effort is directed at resolving experimental/experiential field data into levels of principle consistency.

As a descriptor for the whole, the field can not be seen as "thing" nor can its existence be viewed as preceding or following the parts through which it is presented. Nevertheless, deriving from the work on life-fields, for example, by Harold Saxton Burr (See *Blueprint for Immortality*, Neville Spearman Ltd., London, 1972) the life-field is, essentially, seen as a template (thing) through which the flow of matter appears organized in the form of life-systems (organisms). The famous ghost-image Kirlian photograph is taken as evidence of this interpretation by some. In contrast, we see the life-field as the wholing interrelation of part-part relations and part-whole (or part-other) relations, the essence of which is that a "life-system is a whole".

The following excerpt is chosen to exemplify one level of field, the creative (psycho) field. It should be noted that in this particular case the existence of the field is detected through next-level (socionic) systems (symbol patterns).

*"As yet, we have said nothing concerning the actual nature and qualities of the creative field itself. This is a subject of a completely different kind from the consideration of the creative process and must be pursued*

*differently, for a field can seldom be recognized directly. It is observed rather through the effects it produces, as in the case of electrical, magnetic, or gravitational fields. We need to use such an indirect approach to study the creative field. We must examine its effects - the creative patterns - and through them, as with the patterns of iron particles, attempt to discover as much as possible about the nature of the field that generated them.*

*We can begin to do this most easily through a study of symbols - especially the major types of transpersonal symbols that emerge recurrently in human consciousness, and are considered therefore to have archetypal origins. Archetypes, as Jung indicates, are patterns of energy within the creative field itself. It is these energy patterns that, recurrently and universally, produce archetypal symbols in the mind by organizing mental elements in ways that correspond to their own configuration.*

*This interaction gives us the clue to tapping the energy of the creative field at will. By deliberately visualizing such a symbol, we form in our mind a pattern that is in tune with the creative field, and therefore can be brought to reverberate with it, and thus draw energy from it. We establish such a reverberation by concentrating on the visualized image and its deeper meaning with sufficient mental tension. The symbolic pattern within our mind thus absorbs a portion of energy from the field. It then transforms this energy, steps it down, and lets it flow to nearby mental elements, and eventually to our feelings. The particular kind of symbol or pattern chosen will determine the mode of the reverberation, and thus the particular quality of energy absorbed and the corresponding feeling evoked.*

*Thus, symbols have both a transmuting and a selective property. Jung, one of the foremost authorities on symbols, stated that: "The psychological mechanism that transforms energy is the symbol." Assagioli talks about symbols as "accumulators, transformers, and conductors of psychological energies", and goes on to explain how, because of these properties, symbols are well suited as tools to foster creativity, personality integration, and expansion toward the transpersonal dimension."*

James Varigu, "Creativity", *SYNTHESIS 3 - 4*, (1977).

## EXEMPLAR ON ATOMS

Consonant with emergent cosmologies centered on the holographic concept of reality is a growing opposition to the notion of "atom". In particular it is argued that, if each part reflects the whole, then how can there be elementary units. Again, this question reflects the paradoxical nature of the SYSTEMIC world view of modern science in which the whole is taken to be identical to the totality of the parts. The problem is simply to identify atomic constructs which are themselves images of the whole rather than being only components in a total aggregate. In this framework we have hypothesized the existence of bions (atoms of life), psychons (atoms of behavior), sociions (atoms of humanity or organization), etc. along with the physical-chemical atoms.

To exemplify this we review certain data suggesting the existence of the bion. The following summary paraphrases a section of a paper by William A. Tiller "Some Energy Field Observations of Man and Nature" in *The Kirlian Aura*, eds. Stanley Krippner and Daniel Rubin.

A review was presented of some "of the experiments of Kim Bong Han (1963, 1965), which purport to have (a) delineated the morphology and the environmental structure of the acupuncture meridians and the active elements of the acupuncture points, (b) measured the circulation of a fluid within the meridians independent of the other major body circulatory system." The important point in the present context is that Kim has purportedly identified unique granules circulating in the meridian (duct) liquor.

*"These granules have been named Kim Bong Han Sanal. The Sanal develops into cells and after a lapse of time converts back into Sanal. There is a continuous renovation of cell tissue which is controlled by the meridian system. Sanal contains DNA, RNA, and protein. Kim has been able to grow in vitro cells from Sanal. The process is that Sanal flows in the meridian liquor. It forms by fusion into a cell and after a limited life bursts through the cell membrane to recirculate in the ducts as Sanal.*

*Besides his discovery of cell formation from Sanal, Kim made important observations concerning cell division. When the cell is a stable unit, the Sanal is in a fused state. During cell division it breaks down in such a way as is suggestive of the behavior of chromosomes. Kim claims that chromosomes appearing at a cell division are Sanal, and cell division is a specific form of movement of Sanal. The inheritance of life attributed to chromosomes is an aspect of Sanal and part of the organization of the meridians.*

*The cell theory holds that the cell is the uniting morphological and functional unit of the organism and that cells are formed only from cells through cell division."*

If the Kim experiments are consistently reproducible, they would be in conflict with current theory, but would be consistent with bionic theory.