

A Quaternion of Metaphors for the Hermeneutics of Life

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Sections Abstract, Expansion and Summary (including two Tables) have been added to this reprint.

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 168²

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 Added

ABSTRACT

Four different metaphors of an individual (*organism, machine, mind, and template*) that are the basis of alternate conceptualizations of life and the corresponding modes of discourse are presented. Their relationships are formulated in seven theses. While they appear contradictory and give rise to paradoxes when taken ontologically, the metaphors reveal their complementarity when considered epistemologically. The use of the term quaternalion is explained. The application of the metaphors to compound as well to decomposed entities is discussed. In the last section that was not included in the “General System” publication and its reprint³, possible embedment of the metaphors in analytic typologies is explored, an argument for epistemic pluralism is advanced and the basic theses of the paper are summarized.

 169

INTRODUCTION

While the physical sciences have by now achieved a great deal of conceptual purity, the situation in the life sciences remains confused.

² Original page number in B. H. Banathy (Ed.), *Proceedings of the International Conference of the Society for General Systems Research*, Vol. I, pp. 189-175. Seaside, CA: Intersystems Publications, 1985.

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³ See footnote above.

This is in part due to a mixing of metaphors about the nature of life that underlie attempts at the conceptualization and formalization of living systems. Perhaps a clear articulation of the various metaphors would be a step in the direction of conceptual clarification.

In this paper four such metaphors will be outlined. They are the metaphors ORGANISM, MACHINE, MIND, and TEMPLATE. I am calling them a QUATERNION, employing the term first in its general meaning, as a *set of four parts*. In this sense of the term, my assertion is simply that EACH METAPHOR IS A BASIS OF A COHERENT AND DISTINCT SYSTEM OF DISCOURSE that is capable of conceptualizing most, if not all the phenomena characteristic of life.

The systems are *mutually conceptually exclusive*, in that an intrusion of terms from one system of discourse into another leads to conceptual confusion with severe theoretical consequences.

My second thesis is that although the four metaphors seem to be contradictory if treated as ontological statements about the nature of living systems (and thus the opposition of any two of them gives rise to an unsolvable paradox) — the paradoxes are dissolved when each metaphor is treated as a different matrix for expressing *different epistemic attitudes*.

My third thesis is that each metaphor does indeed reflect a different type of curiosity about living systems, and thus gives rise to a different system of discourse appropriate to a specific kind of epistemic concern. While each is valid and irreplaceable as a vehicle for a given epistemic attitude, *all four are necessary* for the conceptualization and explanation of all the phenomena of life that give rise to different types of legitimate curiosity.

The fourth thesis asserts that *each metaphor* (and the theoretical formulation and type of discourse based on it) *is complementary* in the strict sense *to each of the three other metaphors*, theoretical formulations, and types of discourse.

The fifth thesis is that while employing a particular metaphor, an *ontological commitment* to its reality *is psychologically inescapable*, since the interpretation of experience occasioned by its employment gives rise to a compelling sense of empirical validation. During the period of such epistemic engagement, the three other metaphors appear as ontologically imaginary.

The sixth thesis is that a *different interpretation* of life arises *depending on the order in which the different metaphors are employed*.

As a reminder of the above theses, the mathematical sense of the term quaternion may be helpful. As a mathematical concept, a quaternion is a generalized complex number that is the sum of a real number and a vector and that depends on one real and three imaginary units, the third of which is the product of the first two and also the negative of

this product when the order of the factors is reversed (so that multiplication over the field of quaternions is not commutative).

The seventh thesis is that in view of the previous theses, the task of the theory of life is not the reduction of the phenomena to any single metaphor. It is the development of all into formal theories, and ultimately the *development of a theory of transformations enabling us to move* in an orderly fashion *from one type of theory or discourse to any of the others*.

The scope of the paper permits only a brief presentation of each metaphor  170 with occasional comments reflecting the above theses.

The field of phenomena that is the basis of our construction of living systems can be formalized as the activity of five kinds of systems: (1) INDIVIDUALS, (2) GROUPS, (3) AGGREGATES, (4) COLLECTIVES, and (5) SITUATED INDIVIDUALS.⁴ While all these formalizations are equally appropriate, in the life sciences the tendency is to regard the formalization as a situated individual as being closest to our immediate experience. It is therefore usually the first systematic formulation, where the field of data is seen as reflecting the relation between an individual as an element and the remainder of the field - a situation - as its complement. Only later is the field reformulated as reflecting the processes of group, aggregate, or collective systems. While this procedure is scientifically arbitrary, there appears no harm in following it as long as one is aware of its arbitrariness. Since my aim here is to reconstruct the intellectual processes involved in the various interpretations of life, I shall follow the procedure.

Depending on what type of system one postulates as being reflected in the field of experience, one invokes as a primitive basis of conceptualization a metaphor about the fundamental nature of the system that is reflected in the field of phenomena. While different metaphors about the basic nature of groups, aggregates, and collectives are available, it seems that the metaphors first invoked in the conceptualization of the field of life phenomena are the metaphors about the nature of the individuals. I shall, in this paper, concentrate on them.

THE MIND

I am discussing this metaphor first, not because I regard it as more basic or more adequate than the three others, but because it is the one that is most familiar to me, having grown up within the Indo-European tradition of thought. It is indeed the framework for what Huxley called *the perennial philosophy*. We find it reflected in Gilgamesh and almost fully articulated in the Vedas. It is the foundation of Judaic, Greek, Islamic, and Christian theology and philosophy. It is refined by Descartes and Locke; generalized by Kant, Hegel, Schopenhauer, and Nietzsche;

⁴ Cf. R. Jung (1983c): 169-171.

and formalized by the English philosophy of mind and action. The psychology of Freud, McDougall, James, Piaget, and of others rests on it — as does the sociology of Marx, Pareto, Weber, and Durkheim, the anthropology of Lévy-Bruhl, and the linguistics of Chomsky. Its fullest modern articulations are found in de Chardin as well as in Wittgenstein, Husserl, and Heidegger.

In this tradition, the field of living phenomena is approached hermeneutically with the epistemological attitude well captured in the liturgical phrase: *Omnis mundi creatura, quasi liber et scriptura...* Every phenomenon of life can be treated as a text, the meaning of which can be understood as the expression of the relation of a mind to a situation. The situated individual is conceptualized as a situated mind, and its relation to its situation as action. *Action* is that *aspect of the relation between the individual system and its situation to which meaning can be assigned* on the assumption that it is the expression of the individual's mind.

The basic structure of the mind has been reduced from its many components in ancient Indian philosophy (culminating in the psychology of the Vedanta) to the three faculties of scholastic psychology: conation, cathection, and cognition. Neither Kant nor Freud has moved out of this framework, which undergoes only cosmetic changes in the modern formulations such as *belief and desire*. While the aseptic English philosophy of mind (with a few exceptions) has tried to dispense with the faculty of conation, it has been regarded as the essential one in continental thought, in Freud (anal phase) as well as in Heidegger (*Entschlossenheit*).

The three components of the mind are composed into a vector, which accounts for the kinetic propensity of the mind to actively relate to its situation. The vector lends introspective (subjective) meaning to the individual's conscious experience, and communicative (intersubjective, objective) meaning to his actions. While in earlier formulations this vector has been variously conceptualized, since late scholastic thought (and particularly since Brentano) it has been generally conceptualized as INTENTION, *i.e.*, the abstract relation between the mind as a subject and its situation as an object. The narrower concept of intending (or purposivity), that underlies most formulations in the current psychological and economic theories and practical philosophies, is simply a special case of intentionality: a relation of the mind to possible future situations.

It is in this narrower sense of intending that the fundamental importance of the component of will (the faculty of conation) is most obvious. The voluntarist attribute is essential to the metaphor of mind and gives a clear indication in what circumstances mentalistic vocabulary and the discourse based on it are appropriate. The concept of will is unthinkable without its corollary, the freedom of the will. This attribute of mind

has been maintained in the Indo-  171 European tradition, notwithstanding the philosophical difficulties it led to (e.g., the restrictions on the omnipotence of God), because it is a prerequisite for the formulation of the concept of individual responsibility for action.

The basic structure of mentalistic discourse consists then of the interpretation of the relation of an individual and its situation as ACTION that acquires meaning, and thereby *intelligibility and warrantability*, by reference to the individual's intentions. These are the resultant of the interplay of its conations, cathections, and cognitions. The cathections can be wholesome or perverse, the cognitions valid or mistaken, the will free or overwhelmed by duress. Within the just mentioned constraints on his faculties, the individual is seen as *responsible* for his actions.

Discourse based on the metaphor of mind is the DISCOURSE OF SOCIAL CONTROL, *i.e.*, CUSTODIAL DISCOURSE, in which the experiences of guilt, shame, anxiety and the sanctions of reward and punishment play a central role. The internalization of this mode of discourse as self-representation and representation of others as minds is at the core of the process of the socialization of man and also plays a role in the domestication of some animals. As the other modes of discourse based on other metaphors, it is not competitive, but complementary with respect to them. The question is not, ontically, which discourse is 'true,' but rather, epistemically, which is appropriate to a particular concern. Each discourse is also semantically closed with respect to the others. Thus it is senseless to argue from the determinism that is intrinsic to behaviorist discourse based on the metaphor 'organism' (to be discussed next) against the voluntarist doctrine — and experience — that the will is free.

As recorded in its literature over the last four thousand years, the vocabulary and discourse derived by Indo-European thought from the metaphor mind is the primitive framework for even the most recent attempts to develop a scientific theory of action that formulates the individual as a psychological, the group as a socio-psychological, and the aggregate and the collective as a sociological (including economical and political) system.

THE ORGANISM

It may be difficult for some to consequently think of the conceptual complex 'the organism' as a metaphor for the interpretation of individual living systems, rather than as a veridical description of their fundamental nature. All we need to do, it appears, is to look, and if necessary to dissect, in order to be convinced that living systems 'are' indeed organisms. There are however some of you, possibly many, who have the same difficulty when it comes to thinking of 'the mind' as 'merely' a metaphor, since all introspective evidence points incontrovertibly to its

‘real’ existence. It is precisely the opposite conclusions that the two sources of evidence, internal and external, compel us to accept.

This is the source of the mind-body problem, which, ontologically, creates a paradox. The futile attempts to resolve this paradox characterize much of the theology and philosophy of the middle ages, with the evidence of the corruption of the body pitted against the seemingly obvious inference from introspection that the soul exists and is immortal. Hundreds of years earlier, the dramatic story of Prince Siddhartha’s (Gautama Buddha’s) traumatic encounter with the evidences of the locality and impermanence of the organism that contradicted his naïve introspection couched in Hindu beliefs in the pervasiveness and everlastingness of the mind. Only subsequent years of deep and critical introspection led to his ontological resolution of the conflict. He proclaims in the doctrine of *anatta* the non-existence of the Self (on the basis of both external and internal evidence). What follows is a tragic saga relating simultaneously the triumph of critical philosophy (rejecting deceptive pointing beyond evidence), of positivism, and of phenomenology — as well as the failure to resolve the paradox without denying the logical and psychological necessity of the experience of Self (within the mentalist discourse), based on an inability (first overcome by Kant) to shift from an ontological to an epistemological perspective.

The point of this paper is precisely to argue that what appears as an ontological paradox can be satisfactorily treated as an epistemological complementarity. Evidence of the five senses and of introspection (of the sixth sense) is modified by learned conceptual frameworks before it becomes compelling cognition. Anybody who has learned to use a microscope knows that he had at first to learn ‘to see’ what later appears to be obviously there, and anyone reflecting on the changing accounts a child gives in the course of its development will acknowledge that the child learns only gradually and with difficulty mentalist constructs such as intention, knowing, desiring, willing, I, freedom, mistake, bad, or responsibility. I hope it will become even clearer when we turn our attention to the metaphors ‘machine’ and ‘template,’ that given an appropriate epistemic orientation, the evidence for their ontological reality becomes equally compelling, and that new ontic paradoxes arise which can be dissolved by realizing that the alternatives are not *de re*, but *de dictu*. From the perspective of this paper the ultimate reality of a living system is an unknowable  172 noumenon. We can at best choose, according to our epistemic purpose (kind of curiosity) an appropriate discourse within which we conceptualize and explain the phenomena of life.

Phenomena reflecting the activity of a situated individual system can be interpreted as behavior if we conceive of the individual as an organism and its situation as an environment. Although we have a detailed ‘scientific’ elaboration of innumerable subsystems and processes within the naturalistic discourse arising from a consistent application of this

metaphor, surprisingly there is no articulate philosophy of organism and behavior. This is perhaps because the philosophy of mind and action precedes the sciences of psychology and sociology, while scientific biology coexisted even at the time of Aristotle with philosophy and soon overtook it as the realm of application of naturalistic discourse to the phenomena of life. The major formulations of the natural philosophy of life are uncritical — and are not only in the Middle Ages, but even now (e.g. in Bergson or in Popper and Eccles) examples of the philosophers' inability to respect the semantic closure of the discourse, invoking (in the Aristotelian and scholastic tradition) as key 'explanatory' ideas within the concept-complex organism vitalist notions such as *l'élan vital* or 'the embodiment of mind.'

The metaphor organism gradually developed from the anatomic metaphor of architecture of parts (held together by mysterious vitalist forces) to the physiological metaphor of organs (cooperating by virtue of voluntarist categories such as common purpose). The current metaphor is of a chemical system possessing a special material basis (carbon, water) and unusual thermodynamic character. The most elaborate and coherent thermodynamic formulation so far is by Prigogine. The organism is conceived of as an open system with a dissipative structure, trapped in a dynamic equilibrium of relatively low entropy by autocatalytic and cross-catalytic reactions. The phenomena of fluctuations, irreversibility, self-maintenance, self-organization (autopoiesis), self-reproduction, irritability, adaptability, amplification of response (in seeming defiance of the second law of thermodynamics) seem understandable, though not yet rigorously explained, within this framework. With the addition of the formal cybernetic notions of dynamic hierarchy and feedback (first clearly formulated by Sommerhoff⁵), the apparent purposivity and equifinality of living systems seem also understandable.

Yet again we are in danger of mistaking the latest 'scientific' formulation for ontological evidence. We must remember that for earlier generations, their theological, philosophical, and scientific elaborations of the metaphor 'organism' were equally ontologically compelling. Wherein lays the progress? It lays in the increased hermeneutic and explanatory power of the metaphor through its new elaboration, in increased respect for the closure of naturalistic discourse substituting biophysical for mentalistic ideas, and in the reduction of vitalist vocabulary to a common naturalist terminology. In all its various guises, we are still dealing with a metaphor particularly suitable for the interpretation and explanation of the phenomena of life, given a particular epistemic purpose, namely a curiosity about the positive, objective aspect of phenomena accessible to our senses and manipulable by macrophysical interventions.

⁵ Sommerhoff, G. *Analytical Biology*. Oxford U. Press, 1950.

There were many attempts to distinguish and contrast the essential features of the metaphors 'mind' and 'organism', the mental and the physical, body and soul. Of the modern formulations, those of Descartes, Kant, and Brentano still appear almost successful. Descartes' distinction between the mind as *res cogitans (intensa)* and the organism as *res extensa* correspond to my conception of the organism as a concrete, macro-physical entity, while the mind I envisage as an abstract, semantic entity. Kant's idea that the body is essentially extended in space while the mind is essentially extended in time do not take into account our current belief that some chemical and most physiological processes are irreversible in time. Yet the distinction is not without appeal. Time seems to mean a very different thing within the two metaphors. Within the metaphor 'organism' it conveys the ideas of direction and of duration, while in the metaphor 'mind' it conveys the idea of sequence of actions (e.g., the order of execution of algorithms in a program). But even this distinction is not very firm. There are also difficulties with Brentano's distinction defining mental states, as being characterized by 'intentionality', or as some would have it, 'aboutness'. I feel that the definition is too narrow, and that in fact abstraction is the defining criterion.

The metaphor 'organism', like the metaphor 'mind', specifies the stuff the system consists of, or in Aristotelian terms, asserts its material ground of being. The organism is seen as *configuration of energy*, while the mind is seen as a configuration of meaning. Actually the term meaning refers only to a particular level of organization of the stuff of mind (just as the term energy does in case of organisms). Perhaps a more general term would be the Greek *eidolon*, referring to an image or a representation as well as to a ghost. It is precisely  173 the ghost-like quality of the stuff of the mind that most thinkers on the subject have trouble with; yet it is captured precisely by the German term *Geist*, which connotes not only the mind, but also the spirit. But the discussion of these finer points exceeds the scope of this paper. It must suffice here to say that the notion 'meaning' is here intended to stand for the concepts of information, meaning (narrowly defined), and sense, while the notion 'energy' is intended to stand for quanta, (energy narrowly defined), particles (matter), and electro-magnetic and gravitational structures of space-time.

The conceptualization of an individual system based on the metaphor 'organism' is that of a physiological system in which a thermodynamically improbable state is maintained by exchanges of various forms of energy (including matter) between the various subsystems, and between the system as a whole and its environment. It is the energy (including matter) exchanges with the environment that constitute the essence of the concept BEHAVIOR. Corresponding to the concept 'intention' in the psychological system is the concept of energy potential in the physiological system. The potential gradients between the subsystems

and the system and its environment account for the phenomenon of amplification of stimuli to responses that is one of the striking properties of organisms. Phenomenally the energy configuration called organism is characterized by maintenance of temperature within a narrow range and mostly differing from that of the environment. The internal processes as well as the behavior of organisms are dependent on, and their rate is often a function of the organism's temperature. The concept of temperature is also central to the conceptualization of aggregate systems compatible with the metaphor. Central to the conception of an ecological system is the conception of a thermic web (food chain) with the various types of organisms providing energy for others.

NATURALIST DISCOURSE based on the metaphor 'organism' is clearly the proper language of the life sciences. In this the behaviorists were right, although the attempts we have seen so far to develop a science of behavior are obviously inadequate. However, the program is far from dead, and is receiving new stimuli from developments in ethology, sociobiology, ecology, and medicine. The naive and primitive atomism and simplistic determinism of early behavioral science must be replaced by a thorough grounding in the theory of very large, complex, and probabilistic systems. The epistemic individualism, which prevented the behaviorists from recognizing the biological implications of man being a genetically underdetermined and communicatively codetermined social organism, must also be abandoned.

THE MACHINE

Ever since LaMettrie in 1747 scandalized the tender-minded by jumping where Descartes feared to tread and declared man also to be a 'mere' machine (while Descartes reserved primarily for man the duality 'soul-automaton'), the metaphor 'machine' became increasingly ontologically compelling. The idea was of course not new: even the Buddha occasionally contrasted this metaphor (likening the aggregates of which man is composed to a wooden contraption) to the metaphor 'mind.' The three revolutions that came since — the industrial, the cybernetic, and the informational — saw more and more of the characteristics previously regarded as intrinsic to the metaphors mind or organism exhibited by man-designed machines. The increasing use of prosthetic devices and design of man-machine systems for execution and control eroded further the resistance to thinking of men as machines, until it now reached almost the status of a fad. This is particularly evident in new intellectual fields, such as cognitive science, where the metaphor 'machine' is, in my view inappropriately, used in formulations such as computational, inferential, or cognitive engines. If we interpret an individual system as a machine, its relation to its situation is conceptualized as its PERFORMANCE.

Like organisms and unlike minds, machines are systems of energy (including matter). Unlike organisms, however, the essential characteristic of the machine is not the stuff it is made of, but rather, in Aristotelian terms, its formal ground of being. Essentially a machine is a particular system of constraints. These constraints channel the energy introduced into the machine from specific aspects of its environment (its input) at specific other aspects of its environment (its output). Corresponding to the mentalist concept of intention and the naturalist concept of potential we have the mechanist concept of DISPOSITION. A disposition of a particular system is the probability that a particular system of constraints (machine) will under a specific range of boundary conditions (states of its environment) apply a load on a specific set of states in its environment, which will thereby become modified. In other words, the machine will engage in WORK.

More precisely, the system consists of four sets of CONSTRAINTS: (1) input conditions that determine the input of  174 energy, (2) design conditions that prevent the energy from dissipating freely, (3) general boundary conditions that reinforce, weaken, or modify the design conditions, and (4) output conditions that engage and align (or disengage and misalign) the energy output with specific states of the environment. Energy is of course dissipated against all four sets of conditions. The proportion of energy used in applying a load against the target states — rather than dissipated in energy acquisition, struggle against design constraints, and compensation for boundary conditions — is a measure of the efficiency of the machine, while the amount of the modification of the target states is a measure of its effectiveness.

With the advent of cybernetics we now have a theory of adaptive machines, which modify their design constraints depending on the other three sets of conditions. This is a step from machines that execute to machines that also control — from dumb to intelligent machines.

The internal dynamics of any machine replays for subsystems the general theme: other subsystems constitute the situation of each subsystem and the performance of each subsystem is analyzed and evaluated in the same terms as the performance of the whole machine.

Increasingly biologists have been employing, more or less consciously, the metaphor 'machine' in the analysis of living systems as well as in the design of prosthetic subsystems and simulacra. In psychology the use of the metaphor has been equally widespread, though largely unconscious or denied. Without realizing it Ryle has substituted, in his attack on mentalism and his defense of behaviorism, not naturalist concepts appropriate to the metaphor 'organism,' but many mechanist concepts, such as 'disposition,' appropriate to the machine metaphor. Most formulations in individual (personality) psychology, thought by their originators to be 'humanist,' are actually applications of the machine metaphor, postulating the disposition of particularly

constrained 'personalities' to differential performances in specified situations. The domain of intelligence has been almost exclusively conceptualized on the metaphor 'machine.'

When the metaphor is extended to aggregate systems, we have (as a companion to the formulation of an individual mechanical system) the formulation of an aggregate system called CIVILIZATION. Within this framework it is only the performances of the individual systems that are of interest, not the material in which the machines are embodied.

TECHNOLOGICAL discourse based on the metaphor 'machine' is obviously appropriate to engineering, agronomy, and medicine. Perhaps less obvious is that it is the only appropriate discourse in areas usually (sometimes hypocritically) discussed in mentalist terms. The sphere of personnel selection and evaluation is one. Much of what is discussed mentalistically as 'socialization' would be more appropriately formulated as domestication, *i.e.*, the modification of internal constraints to manipulate dispositions toward specific performance. Much of our social interaction is also concerned with eliciting specific performances, in which one person attempts to function as the control system for the other whom he wishes to act as an executing system.

THE TEMPLATE

Unfortunately I have not been able to find in the literature a standard name for the fourth metaphor, which in the Indo-European tradition is poorly articulated. If the term template reminds of the term mold, the association is as intended. In its general meaning, template is any form or pattern used as guide and/or standard in the production of a particular kind of object. This is close to, but not quite my intended meaning. The term directs too much attention to the external source of the form of the product, and too little to the presence of the form in the product. A product can itself be the pattern on which a mold can be set with which other copies are cast. Thus templates are potentially self-reproducing.

I believe that the term template originally arises in the context of weaving, and is also used to describe any single configuration of strands in a tapestry. This is the basic image I wish to convey: a specific joining of strands in a web of meanings, a multiple nexus within a semantic plexus, *a meaning or form of an entity arising from the characteristics of its context.*

The idea is familiar from evolutionary theory: the form of an individual is the result of its adaptation to a particular *oikos*, habitat, or niche. The conception of nature as a set of niches emphasizes the accidental character of the configurations by which the individual is molded. In this conception the set of constraints to which the individual must adapt to survive is not a well-designed system, but to quote from Freud's definition of reality, simply *the way things are.* Heidegger who

sees man as thrown into a world of preexisting facts also favors this conception. This state of affairs, alien as it may be at first, asserts itself as a set of demand-  175 or challenge-characteristics of the environment (to use Egon Brunswick's term *Erforderungscharakter*) to which the individual must respond. Like a product cast in a mold, he assumes characteristics complementary to the features of the mold.

So far I have described templates as habitats in nature, but the metaphor is equally evocative of habitats in culture. Here culture is seen as the aggregate system corresponding to the individual system template. Treating culture (or nature) as a system in no way attributes to it any 'systematic' features. It is not like a French formal garden, not even like an English one, but more like any odd ditch or swamp with all kinds of weeds populating it as a result of accidental seeding and survival. Rather than resembling a computer-designed microchip, it is reminiscent of a quilt put together by a blind person on odd occasions from just then available (to quote Kroeber's definition of culture) *rags and patches*.

In European social science, this metaphor has been employed most systematically in the Roman Law conception of *civitas*. Most likely influenced by it, Max Weber's conception of 'office' is one of a template to which humans are called or appointed. In American sociology (most clearly articulated by Parsons who explicitly followed Max Weber in this respect and that critics called *the over-socialized view of man*), concepts like 'role' and 'status' are templates. The concept of 'institution,' originating in Roman law, is in modern sociology a configuration of templates, or a cultural habitat. The process of molding to a template has been most clearly described by Kierkegaard under the heading of 'individuation,' by Freud as 'identification,' by Mead as 'internalization,' and by Piaget as 'accommodation and assimilation.'

The major elaboration of the metaphor has occurred in Chinese social philosophy. Anchored in the idea of harmony that pervades most of Chinese philosophy, Chinese social thought has avoided the preoccupation with the innermost nature of man so characteristic of Indo-European, and particularly German mentalistic thought. The relation of the individual to its situation is conceptualized as CONDUCT. Instead of the meaning of the relation deriving from individual intentions composed of will, desire, and belief, the internal state corresponding to conduct is the APPROPRIATENESS of attitude to the situation (reminiscent of Aristotle's faculty of *ai'sthesis*).

Like the metaphor 'mind,' the metaphor 'template' leads to the formulation of a system whose material ground is meaning. But as in the case of the metaphor 'machine,' the primary concern is with formal grounds. The individual under the metaphor 'template' is conceptualized as a system of internalized constraints, the process of internalization being phylo- or ontogenetic.

Perhaps the image of individuals as marionettes — whose strings are pulled by natural or cultural accidents that occurred not just recently, but often years, generations, or eons ago — has emerged before the reader. Unfamiliar as this image may be, it is yet another valid conceptualization of life, and complementary to the three others previously discussed. On it is elaborated a form of discourse clearly suitable to the description of evolutionary processes in nature and to what Elias has called the *civilizing process* in man. It is the language of convention and of ritual, the realization of the dramaturgical metaphor so brilliantly applied by Goffman to everyday social life.

 *Added*

EXPANSION

The four metaphors are among the most elementary schemata we use to make sense of individual entities in the world. In the previous sections they have been described and their relation to each other formulated. In order to place the discussion of the quaternion of metaphors in a larger theoretical context, their application to compounded and to decomposed individual entities will be considered. Their possible embeddings into more analytic typologies will be explored.

APPLICATIONS

The metaphors serve initially and primarily as means of interpreting the activity of individual entities and can provide the conceptual basis for their analysis as systems. The kinds of discourses they facilitate are also suitable for interpreting more compound entities and in their system analysis. The four metaphors and their application are summarized in [Table 1](#).

[Table 1](#). Quaternion of metaphors:
Interpreting various discourses and entities.

| | | | | |
|------------------------|------------|-----------|--------------|----------|
| DISCOURSE | Naturalist | Custodial | Technical | Ritual |
| INDIVIDUAL | Organism | Mind | Machine | Template |
| SITUATED INDIVIDUAL | Behavior | Action | Performance | Conduct |
| PLENUM | Ecology | Society | Civilization | Culture |

In the first row of [Table 1](#), the kinds of discourse associated with each metaphor are listed, *i.e.*, *naturalist*, *custodial*, *technical* or *ritual discourse*. Custodial discourse encompasses *i.a.* discourse of social control, much of existentialism (e.g. Heidegger's 'man as guardian of be-

ing'), many of Freud's propositions (e.g. concerning civilization, super-ego, repression, secondary process) and of the control of perception. Ritual discourse can also be also viewed as *script*.

Of the five kinds of concrete entities (units) that are available for analysis (*individual, group, aggregate, plenum, situated individual*⁶) the metaphors are initially applied to individuals, and the interpretation is then extended to individuals situated *vis a vis* groups, to groups, to aggregates and finally to plena. The same procedure has been partially followed here.

The terms for the metaphors as applied to *individuals* are given first. Then the terms for the entity called *situated individual* are listed, followed by the terms employed when the interpretation is applied to *plena*. A direct application of the metaphor organism to a plenum in ecology is its application to a *thermal web*.

The different metaphors and discourse can also be applied to the decompositions of entities, e.g. respectively to diseases, organs and cells; to memory, dreams, hallucinations and decisions; to components and mechanisms; or to weddings, burials, masses, agreements and to forms of greetings and of love making.

ANALYTIC EMBEDMENT

The four metaphors discussed are ancient, almost primordial devices of making sense out of the external world. Although they are abstractions useful for the hermeneutics of life and perhaps beyond for the hermeneutics of the world, they are nevertheless quite primitive epistemic tools with no analytic power. They can, however, be embedded in various analytic spaces, by a procedure that Allan Barton, more than half a century ago, called "Subtracting the attribute space of a typology".⁷ Some examples of possible analytic embedment are represented in Table 2.⁸

⁶ Cf. JUNG (1983c).

⁷ Daniel Lerner & Harold D. Lasswell: *The Policy Sciences: Recent Developments in Scope and Method*. Stanford U. Press, 1951. Ch. IX. "Qualitative measurement in the Social Sciences" by Paul F. Lazarsfeld and Allen H. Barton. Esp. pp. 175-176.
Paul F. Lazarsfeld & Morris Rosenberg: *The Language of Social Research*. Free Press, Glencoe IL, 1955. Ch. 5. "The Concept of Property Space in Social Research" by Allan H. Barton. Esp pp. 50-53.

⁸ Some such theoretical or metatheoretical contexts have already been alluded to in R. Jung (1953).

Table 2. Analytic embedment of metaphors and of their interpretands.

| ON (GROUND S OF BEING) | EFFICIENT <i>Means</i> (<i>Naturalism</i>) | FINAL <i>Ends</i> (<i>Humanism</i>) | CONDITIONS OF EMERGENCE |
|---|---|--|-----------------------------------|
| MATERIAL <i>Fact</i> (<i>Realism</i>) | ORGANISM <i>BEHAVIOR</i> | MIND <i>ACTION</i> | PROPENSITIES |
| | HEAT | INTENTION | |
| FORMAL <i>Artifact</i> (<i>Idealism</i>) | MACHINE <i>PERFORMANCE</i> | TEMPLATE <i>CONDUCT</i> | CONSTRAINTS |
| | DISPOSITION | CONVENTION | |
| RES | <i>Movens</i> | <i>Agens</i> | |
| SPACE | <i>Physical</i> | <i>Semiotic</i> | |
| SYSTEM | <i>Thermodynamic</i> | <i>Informatic</i> | |
| SUBSTANCE | <i>Energy</i> | <i>Meaning</i> | |
| CONSTITUENTS | <i>Quanta</i> | <i>Bits</i> | |

In the four central cells at the core of Table 2 are summarized the respective interpretation of the activity of an entity: the activity of ORGANISMS conceived of as BEHAVIOR, of MACHINES as PERFORMANCE, of MINDS as ACTION, and of TEMPLATES as CONDUCT.

The first analytic embedment represented from the periphery of the table is in a space of distinctions made by Aristotle between different kinds of **ON** (grounds of being). Thus, for example, the behavior of organisms is the activity of living things seen as founded on EFFICIENT (initial) and MATERIAL grounds of being, while the conduct of templates is seen as founded on FINAL and FORMAL grounds of being. A homologous space can be seen as generating distinctions between FACT and ARTIFACT on the one hand and between MEANS and ENDS on the other hand. It may be that congruent distinctions have been envisaged by Max Weber in his ideal types of action: *AFFEKTUAL*, *TRADITIONAL*, *ZWECKRATIONAL* and *WERTRATIONAL*. We may also consider whether the metaphors can be embedded in a space of philosophical attitudes such as NATURALISM, HUMANISM, REALISM and IDEALISM.

Next are represented the NECESSARY CONDITION FOR THE EMERGENCE of entities under a particular metaphor. These can be visualized as urges or as driving forces that find their expression in the activity of the en-

tity. On the one hand these are PROPENSITIES: in organisms HEAT that powers their behavior and in minds INTENTION that motivates their action (and experience).⁹ It is this characteristic of organisms and minds that may have led Rom Harré in his rejection of physicalism and mechanism in biology and psychology to the assertion that we here deal with generative entities. The conditions for emergence of machines and templates (scripts), on the other hand, are CONSTRAINTS. As DISPOSITIONS they regulate the performance of machines and as CONVENTIONS the conduct of templates (puppets determined by scripts). In functional systems analysis (formalized by the calculus of variations) the respective propensities or constraints (or their representative elements) are considered essential variables that must attain an extremum, *i.e.*, maximum or minimum possible value (or remain constant) under given boundary conditions.

The last five rows of Table 2 depict an effort to apply the analytic method, invented by Descartes to the distinctions between the metaphors listed in the first and the second column of the core table. At this point it needs to be emphasized that this is not a slide into ontological dualism. The concern is merely to explore how entities and events could be described, interpreted, analyzed or explained, always keeping in mind Vaihinger's '*als ob*', thus entertaining the statements as Ben-
tham's fictions.

The entities, RES, interpreted by the metaphors organisms and machines can then be thought of as MOVENS, whereas interpreted as minds and templates as AGENS. Their movement or actions can be imagined as trajectories in an analytic SPACE, in the first column PHYSICAL, in the second column SEMIOTIC. An entity / thing / res, can be thus reformulated as a SYSTEM, either as a THERMODYNAMIC system or as an INFORMATIC system¹⁰. To formulate a structure of the systems, we posit their respective substance¹¹: ENERGY or MEANING. We can also imagine the ultimate analytic reduction to minimal constituents, in the case of res movens to QUANTA, in the case agens to BITS.

The last five rows of Table 2 no longer display metaphors, but alternative possible descriptions – constructions of reality, or modes of analysis and explanation available to us.¹²

⁹ It is this characteristic of organisms and minds that, in their rejection of physicalism and mechanism in biology and psychology, may have led Rom Harré to the assertion that we here deal with generative entities and others to claims that these are autopoietic system..

¹⁰ While a theory of thermodynamic systems exists, a theory of informatic system is far from complete.

¹¹ The term substance is used in the meaning given to it by a succession of Greek philosophers from Anaximander to Aristotle as the perhaps hidden, but ultimate nature of things. In Latin it is customarily spoken of as *subiectum*, *i.e.*, that which is underlying, or substratum.

¹² Even though this is reminiscent of Spinoza's *sive* (and/or or either or) which in Table 2 arrangement above would be inverted to *Natura sive Deus*, it does not have ontological inten-

SUMMARY

A quaternion of metaphors, each of which can form an alternative basis for the conceptualization and formalization of phenomena characteristic of living individuals, has been briefly presented. These metaphors are deeply rooted in Indo-European thought. Some have been formulated in antiquity, others in the 17th and 18th Century. They are the available grounds for a hermeneutics of life.

Two difficulties arise in much modern discussion: (1) the metaphors are frequently mixed, thus giving rise to unnecessary confusion and pseudo-problems, e.g., the mind-body problem, or the problem of free will, and (2) the metaphors are taken ontologically, thus, by the fallacy of misplaced concreteness, giving rise to conflicting ideological, non-scientific claims as to the real nature of living beings. Such confusions not only underlay the *Methodenstreit* at the turn of the century, and currently linger on in arguments among psychologists and sociologists, e.g., behaviorism *vs.* mentalism, 'scientific' *vs.* 'verstehende' sociology, but also invade conceptions of life anchored in Darwinian biology and sociobiology.

A contrasting view has been presented here, which seems to remove the above difficulties:

- The four metaphors are treated as *conceptually closed and mutually complementary*.
- They are presented as *epistemological analytic tools* serving different kinds of curiosity, either as abstract mental devices for conceptualization of identical phenomena, or as different modes of discourse about the same phenomena.

QUATERNION

The complementarity between all four metaphors is formulated within the construct 'quaternion.' The term is first employed in its general meaning, as a set of four distinct parts. Next, the mathematical sense of the term is invoked as an analogy, which enables to express the complex relations among the four metaphors — noting that the order in which they are employed leads to different results, and that whichever metaphor is employed first appears as ontologically real, the other three appear as ontologically imaginary.

The relations among the four metaphors are defined in seven theses, which assert that:

1. The metaphors are mutually conceptually exclusive.
2. Each is appropriate for the satisfaction of different epistemic curiosity.
3. Each gives rise to a different discourse.
4. Each is strictly complementary to any of the three others.
5. Once successfully employed, each leads with psychological inevitability to an ontological commitment to its reality and makes the others appear imaginary.
6. If several (all) metaphors are successively employed, the final interpretation depends on the order of their employment, and therefore:
7. theories based on a single metaphor or simple combinations of several metaphors are not sufficient to explain coherently all life phenomena, but a more general theory is necessary consisting of transformations between theories based on each different metaphor.

The four metaphors are abstract (mental or linguistic) wholes (*Gestalts*) that are predicated *in toto* or *in parte* on concrete entities. Predication of a metaphor on patterns of observations makes their interpretation possible.

APPLICATIONS AND EMBEDMENT

Since the metaphors are in the first instance applied to individual entities, I have sketched their application to compounded or decomposed entity. While the metaphors are abstract, the abstraction is very elementary and insufficient for analysis. I have therefore indicated how they could be embedded within various analytical typologies.

CONCLUSION

I am personally interested to explore further the metaphors the mind and the template, especially in their formulation as *res agens i.e.*, as a system of meaning within a semiotic space. While in the preceding text action was emphasized as the activity of mind, I wish to consider also its other pole of intention, namely experience. Thus *res agens* could also be called *res discriminans*.

Nevertheless, the general conclusion of this paper is the advisability of epistemological pluralism. There seem to be many different, possibly epistemologically equally powerful, ways to describe and analyze life and the world.