SCIENCE AND SENSE

by Hugh M. Lewis

We live in the modern age of science. Science has become our primary sense making view of the world and it has been spectacularly successful in making sense of our world, at least from a secular point of view. Our modern technological civilization vindicates the efficacy of science and is vindicated by science. Its efficacy in our world is undeniable and unavoidable--anywhere we turn in our world we find its effects and consequences. We have created a good system based upon science, it works very well and we are sticking with a good thing as long as it lasts.

But in the total history of human civilization, science is only a very recent and late development. It has really only been within a single century out of three hundred or so centuries that science can be said to have come into its own and that the great majority of its achievements have been witnessed. Even the last decade has seen the development of new ideas and new applications which far exceeded anything possible before.

It is to be legitimately wondered what the 'structure of the long run' holds for scientific development and whether such a new good thing can last forever or really be so miraculous as some of its practitioners and preachers would want us to believe. Danger signals have already gone off in many different areas of the world and it has been the 'pure scientists' themselves (separating themselves from the technologically 'applied' scientists) who has sounded the first warnings concerning global tends in the development of modern technological civilization. Will we and our earth survive our scientific madness or will our sciences survive our own madness? And even if science does not survive past our modern era, will it continue to grow and prosper at its current near exponential rate or must it eventually overstep its own horizons and reach a kind of plateau of understanding which is able to claim once and for all 'this is the way the world mostly is'.

What direction will we turn in our world if and when our science runs out on us? And what will science become like once it has exhausted most of its possibilities of patterning and potentialities and what will the world then have become?

Does science have natural limits and if so what are the consequences of overstepping these boundaries? Will we then seek out another sense making view of the world once we have gone beyond the horizons of science?

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Another way of asking these questions of science is to question whether science will continue to remain as dependable as it has become in answer and finding lasting solutions to most of our environmental predicaments and existential problems. Will its solutions hold out as stable and permanent or will they in turn lead to other sets and kinds of problems and predicaments which goes beyond its own sense making capacities or will its sense making success and solutions remain viable and efficacious in the long run. If not, then what must we find to substitute for its solutions, if there are such substitutes possible?

Can we even ask, much less answer such questions in a realistic way?

From a philosophical perspective, the study of culture history is situated well within the humanities as fundamentally separate domain and kind of understanding as the sciences--it shares in the Geisteswissenschaftlich vessel versus the Naturwissenschaft of the scientific Weltangshung. The 'two ways of knowing reality' are held to consist of two fundamentally separate and distinctive 'modes of experiencing' human reality which have different kinds of consequences for each--the former objectifies experience as to its phenomenological immediacy and leads to an endless circle of patterning within other patterns, while the latter objectifies experience according too its 'causal efficacy' and leads to a

parsimonious chain of reasoning about the basic structure of 'how the world works'.

But it is the central dilemma of culture history to be positioned between both the horns of academic understanding--it can neither fully accept the methodological constraints of science in the study of human reality and yet it can neither completely reject the efficacy and realism of the scientific attitude and its 'frame of mind'. It must somehow reconcile itself between with both the inanities and the virtues of the two academic cultures of the sciences and the humanities.

Like its close cousins in the social sciences; psychology, sociology and anthropology, culture history is left over to define itself betwixt and between the two cultures of academia--in this case more to the left of the social 'sciences' and therefore closer to the fold of the humanities. It is therefore faced with a crises of identity in defining to the world and for the world its own efficacy and reason for being in the world, and this crises of identity threatens to undermine the entire program as a legitimate field of study, as a valid 'sense making' view of the world.

The resolution of its dilemma of identity rests with the recognition of the unity of experience such that there are not really two separate modes of experience, but in actuality two extremes of a single continuum of experience. The scientific modality is but a more rigorous and systematically constrained version while the modality of the humanities is more loosely, metaphorically interpretative and less well defined. The unity of experience of human reality is primarily symbolic, whether it is taken metaphorically or more strictly as is the case in the sciences.

The culture historical study of science does not simply critique it from the antithetical standpoint of the perspective of the humanities, it proffers in its stead an alternative version of that science--of how science normally makes sense of our world and how we make sense of our science.

From this standpoint, science is not regard culture historically as just paradigm of certain specific world views, but also as certain kinds of 'frames of mind' which have a certain culture historical

provenience in reality. As 'frames of mind' the sciences share with the study of culture history certain non-ideological yet reflexive metalogical attributes of mind--science in its openness and generality shares with culture history the virtue of a 'meta paradigmatic' perspective of mindness.

Like the philosophy of science to which it is related, the culture history of science seeks to find a meta physical framework in which fit our understanding of the role, purpose and functioning of science in our world, but it goes beyond such a kind of analysis in attempting to see the general patterning of science within its proper culture historical contexts and to see science as a particular kind of system of symbolization of the world and in the world. It is with such a view of science that culture history can proffer an alternative model or version of what science is supposed to be and how it is supposed to work and why it is important to be studied.

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It is interesting to compare the two modes of experience as fundamental differences between two cultures of the sciences and the humanities as being fundamentally related to the differences between mind and world view and between beingness and non-being in the world. Though this would over simplify the realities involved in scientific praxis it is an interesting and not irrelevant point of entry in understanding the culture history of science as both paradigmatic and un-paradigmatic, as both generalizing and particularizing, as both ideological and non-ideological, in its many manifestations.

It is also important to realize that like culture history, the study of science has been engaged in a dialectic of symbolic discourse about a central directional axis of its development as 'frames of mind'. It is as dialectic and as directional development that culture history must frame the understanding of the 'mindness of science'.

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Science has become the dominant world view of our modern age, and it has paradoxically also become the main frame of mind informing or sensibilities about our world. Science, from an insider's point of view, claims to be fundamentally, exclusive secular in orientation but from another standpoint it has come to take on important religious and ideological status in fulfilling the void of the non-secular religious traditions which it basically usurped in the world. In its secular status, it has a fundamental relationship to 'common sense' in which it is rooted and from which it grows. The growth of science has meant fundamental change in our sense of commonness and common sense understanding of the world--before its success common sense was informed primarily by the nonscientific religious and ideological beliefs which elevated it from the world of the secular to the levels of the divine. There is nothing divine about the world of science except science itself, and common sense has come to reflect this changed outlook upon the world.

Science in its theory and praxis and in its secular success in the world, leads to philosophical speculation about its status, its relevance, its structure and process, its ontological, metaphysical and epistemological basis in the world, and the human relationship to it. Science as sense is derived from and reflected by the philosophy of its theory and praxis. It is by understanding systematically how and why science is rooted in and derived from common sense that we may arrive at a model of both science and sense as constrained by a secular (non-religious) world view and a fundamentally 'open' 'frame of mind'.

Neither science nor sense are simple phenomena in the world--both embody contradictions of understanding and both entail contradictions of understanding in relation to one another, which renders a philosophy of such understanding extremely problematic and paradoxical. But both have a special and related significance when they become interrelated in their symbolic representations of 'human reality' as being both about human science and human sense--or the science and senseness of human reality.

The understanding and philosophy of science or of common sense cannot be divorced from an understanding of humanness, or of the sense of being human in the world. To claim that science rests upon principles and premises which come before or exist beyond the purview of our human symbolically mediated experience of events in the world is to claim a non-secular (i.e. ideological) status for both science and sense in the world.

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Scientists who see themselves as 'pure' like to think of themselves as fundamentally non-ideological and not committed by their science one way or another to issues in the world. This is an elitist viewpoint which guards the neutrality of science as a prerequisite to its objectivity and success in the world. For these people, science has a special charger and a privileged role in the world which mandates its separateness and distance. It is a simple matter to don a white lab jacket and thereby foster the illusion of special importances and power.

Thus robed, scientists do not begin looking unlike many other orders of priest which see themselves apart with a special mission to accomplish in the world. And like other priesthood the scientists have their methodical rituals, their taboos and prohibitions, their shared lore and their formulas and incantations.

And if 'pure science' itself has not really or is not permitted to take on the trappings of a religion, it is without doubt that science 'in the world'--as it is realized by its many practitioners, popularizers and professors--does take on many of the characteristics of a religion, however secularized it may be. Science as it is interpreted and articulated in the world, cannot but help take on the connotations of any kind of body of belief and praxis of the world, and cannot avoid coming full circle as something less non-ideologically than it is purported to be. Even the notion of a

'perfect science' is so strikingly ideological with its implications of progressiveness and purity, that we are left to abandon the whole argument of the non-ideological status of science as an absurdity of ideological self denial.

We are left to rethink what is meant by the term 'science' and to reconsider its actual, versus its apparent, ontological status in the world. Science as a world view is inescapably paradigmatic and ideological. As an ideology of the world, it is also fundamentally mythological--it is a dialectic about reality which embodies its own sets of contradictions and which also creates its own resolutions to its contradictions.

As modern myth, science constitutes a human cultural orientation with its own foci and its own configurations and styles, and with its own set of core values which characterizes it and leads to its constitution. It is also a phenomena of culture historical patterning with its own sense of distinctiveness and history in the making.

To understand culture historically the essential culture of science is to understand the core of or own modern civilization and to explain what we have become about with all our power and progress.

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If and when our scientistic egos become endangered by such critique, we can attempt to unhook science from its ideological pegs by claiming somewhat tautologically that whatever in science that is ideological is therefore not real science, but 'scientism'. This is a convenient means of getting round the whole dilemma while still failing to address 'what is real about science' or 'what is pure science' if such a thing is necessarily 'non-ideological'. Another way of addressing this issue is to ask what is the critical difference between ideological and non-ideological, and why should 'non-ideological' be preferable, necessary condition for true science and on the other hand, what is inherently wrong with being 'ideological' which would make such a condition inimical to the purity of

science? It seems that such a way out of the fundamental dilemma of science is not thusly resolved, but such attempts at maintaining the scientistic ego only result in an infinite regression of ideological denial and affirmation.

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The resolution of our dilemma comes from understanding the culture history of science as this is part of a larger culture historical process of modern civilization in the world. It is as a culture that science can be better seen for what it is as a sense making methodology of the world--it provides a way of experiencing human reality which is itself embedded within a larger culture historical context of experience--one that is preeminently materialistic, mechanistic, utilitarian, pragmatic, secular. It is world view which rigidly dichotomizes the world between true and false, between identity and difference, between what is and what isn't, between the natural and the supernatural. Within such dichotomies are found its dialectical patterning of mythology and the basis of both it ideological ontology and its claim to a special non-ideological status.

In understanding science as culture history we come to paradoxically to a better understanding of the 'science' of culture history and discover the common ground between the two ways of experience and also the crucial differences between them.

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In regard to the ideological and ontological status of science in the world, we can adopt three points of view. The first is a 'pro scientific' attitude which sees the progress of science in the world as inevitable, as intrinsic to the process of science, and as leading

to beneficial ways of improving the human condition on earth. It is our science which has made a difference between savagery and civilization.

The second, 'sophisticated' attitude sees science as fundamentally neutral in the world--as a 'discipline of disinterested inquiry into the world'--and though it may be used in both negative and positive ways, science itself must, in the pursuit of its own progressive interests, remain indifferent to the human condition of the world.

It has been claimed that adherents to this philosophy are the very puppets of a larger social powers in the world--maintaining a neutral attitude of ignorance and arrogance, of scientific superiority in the world is a way of science as a culture of relinquishing any moral obligation to the world in the practice of their science. These sophisticated 'professors' are, from the standpoint of their world view no different from the pro-scientific promoters and preachers.

A third critical anti-scientific perspective views the practice of science as basically the paradigmatic pawn of power in the world--its progress benefits the few and actually may help to aggravate the predicament of the many others, even if unintentionally. This viewpoint holds that not only is its praxis morally corruptible, if not actually corrupt, but that the very world view and culture of science itself is fundamentally 'anti-life' in that its principles of progress are based upon prediction and control of natural phenomena which inevitably entails acts of destructive consequence.

The anti-scientific attitude views the scientific mode of experiencing human reality as fundamentally destructive--learning the anatomy of the frog entails an analytical act of the destruction of the being of the frog. This mode of experiencing human reality is present in all its various phases, except that the destructive consequences may not be as direct or apparent.

It is not difficult today to look about our world and to find many unintended side effects and destructive consequences of our much vaunted scientific 'Weltaangshaung'--and we cannot facilely deny the crucial role that our science has played in the research and

development, theory and design, of such modern devices of convenience as the hydrogen bomb, the nuclear reactor, or in such phenomena as the depletion of the ozone layer. It is not difficult to become easily disillusioned with the rhetoric and rationalizations of science as to much more ideological white-wash.

None of these scientific attitudes are completely wrong or right. All of them entail partial truths and prejudices. Sciences has been a mixed blessing--it has had both good and bad consequences inspite of the professional hubris of some of its practitioners who regard such moral considerations as unworthy of their own scientific attention. What is most important to realize is that the culture historical attitude towards science adopts a 'hermeneutical' and a 'critical' attitude towards the culture of science, but such attitudes weigh evenly all different points of view. It see science as neither monolithically good or evil, nor as disinterested or 'uninvolved' but rather as complex, polythetic social reality which comprehends the horizons of all its profiles and attitudes and even has its own culture historical understanding of the scientific attitude and world view.

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The only point of view which a culture history of science adopts is that science is anything but neutral and uninvolved in the world, or stands apart as something necessarily separate from the world. Indeed, the culture history of science sees it as something necessarily situated by and in the world, constituted by meaningful relationships with the world. To the extent that this is deemed ideological, then science suffers the same problem of ideology as any other view of the world. Science is not necessarily the less for being ideological and it what science is in the world, inspite of its ideology, and not because of it, that makes it of special interest from a culture historical standpoint. In fact, science exists 'apart from the world' to the same extent and in the exact same way that any and all ideology can be said to separate itself and stand apart from the world--from its own sense of culture historical context in

the world--and so the ideological façade of science exists in the very ideal of its neutrality and privileged distance from the world. Its paradox is that its 'non-ideological' ideal is its own special distinctive ideology--in living the lies of its non-ideological orientation, its promoters are living the illusion of its ideology.

Science exists in the world as something other than its own non-ideological ideology, and it is the culture historical perspective that this 'something more' of science, the science of beingness, is rooted in and reflexive of the mindness of our realities. Science as something authentic is isomorphic with the human expression of mind in the world.

Science came into being as the expression and evolution of mind, as the eventual realization of its possibility in the world. Science gains its status in the world by its reflexiveness and meta-paradigmatic expression of mind. Mind is the basic structure of scientific principles when disinvested and disillusioned of its own ideologies and world view. Science is not without values, paradigms, ideologies in the world, yet like the mythological expression of mythos mindness it seeks to continuously transcend its own limitations. Science, like mind, is therefore a never completed project and an ever emerging, always evolving possibility in the world.

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To speak of science is something of a misnomer. In actuality there are many sciences and many kinds of scientific practices and orientations. 'Science' in terms of a singular generality does not exist in the world as such, except as an example of ideology.

This critical difference brings to bear what Thomas Kuhn has referred to as scientific paradigms and the paradigmatic structure of scientific revolutions. Science as a social and historical phenomena exists as paradigms which consist of accumulated bodies of theory and understanding based upon precedent,

accumulated evidence and accepted practices which are predominant and resistant of counter factual or contradictory evidence until such evidence amasses and alternative theories arise upon the periphery of the paradigmatic orientation which challenge and eventually change the paradigm.

"There are sciences whose 'paradigms' blocks of theoretical precept and precedent that define the orthodoxy of what Thomas Kuhn calls 'normal science' maintain a frozen immobility until their underpinnings are melted by the heat and pressure of accumulated evidence and a plate tectonic revolution results…" (Roy Wagner)

A scientific paradigm is associated with and identified by the strong presence of a 'scientific community' which shares standard definitions of its science. 'A paradigm is what members of a scientific community share, and conversely, a scientific community consists of men who share a paradigm…' (T. Kuhn) Thomas Kuhn recognizes a scientific community that carries on its dialect in a characteristic idiom or jargon which requires years of education to master and which is for the most part inaccessible to the untrained laity or other professionals beyond its borders. Such professionals defines the logos of science shared by its members. Such communities are relatively small, elite and narrowly exclusive with well defined boundaries. Its primary forums are professional journals which are highly technical and relatively remote and inaccessible to the general reading public.

"…A number of characteristics for membership in a professional scientific group must already be strikingly clear, the scientist must, for example, be concerned to solve problems about the behavior of nature. In addition, though his concern may be global in its extent, the problems on which he works must be problems of detail. More important, the solution that satisfy him may not be merely personal but must instead be accepted as solutions by many. The group that shares them may not, however, be drawn at random from society

as a whole, but is rather the well defined community of the scientists' professional compeers. One of the strongest, if still unwritten, rules of scientific life is the prohibition of appeals to heads of state or to populace at large in matters scientific. Recognition of the existence of a uniquely competent professional group and acceptance of its role as the exclusive arbiter of professional achievement has further implications. The group's members as individuals and by virtue of their shared training and experience must be seen as the sole possessors of the rules of the game or of some equivalent basis for unequivocal judgments. To doubt that they shared some such basis for evaluations would be to admit the existence of incompatible standards of scientific achievement. That admission would inevitably raise the question whether truth in the sciences can be one." (Kuhn: page 168)

"A scientific community consists, in this view, of the practitioners of a scientific specialty. To an extent unparalleled in most other fields, they have undergone similar educations and professional initiations; in the process they have absorbed the same technical literature and drawn many of the same lessons from it. Usually the boundaries of that standard literature mark the limits of a scientific subject matter, and each community ordinarily has a subject matter of its own. There are schools in the sciences; communities, that is, which approach the same subject from incompatible viewpoints. But they are far rarer there than in other fields; they are always in competition and their competition is usually quickly ended.

As a result, the members of a scientific community see themselves and are seen by others as men uniquely responsible for the pursuit of a set of shared goals, including the training of their successors. Within such groups communication is relatively full and professional judgments relatively unanimous. Because the attention of different scientific communities is, on the other hand, focused on different matters, professional communication across group lines is sometimes arduous, often results in misunderstandings and may if pursued evoke significant and previously unsuspected disagreement." (T. Kuhn: 177)

According to Kuhn, science is defined by its progress. Scientific communities begin in a 'pre-paradigmatic' stage in which basic controversies of their own definition as science inhibit the formation of a fully 'paradigmatic scientific community'. Basic doctrinal definitions plague such a field of inquiry and hinder its 'progress'. 'Furthermore if precedent from the natural sciences serves, they will cease to be a source of concern not when a definition is found, but when the groups that now doubt their status achieve consensus about their past and present accomplishments…'(Kuhn: 160-161)

A science, then, achieves paradigmatic maturity when its community of professional practitioners achieves a sense of relative unity and uniformity about basic definitions and standards which serve as the foundation of their science. A science will then grow and proliferate, and will achieve a 'post paradigmatic' period of greater breadth and specialization. Separate communities emerge sharing in the same broad paradigm, but each pursuing its own narrow range of related interests--'Though science surely grows in depth it may not grow in breadth as well. If it does so, that breadth is manifest mainly in the proliferation of scientific specialties, but not in the scope of any single specialty alone.' (Kuhn: 170)

The notion of progress somehow informs a scientific community of its own corporate identity and becoming paradigmatic implies some form of progressive evolution of the field, if not toward some futureward vision, then at least in a retrospective sense of looking back at the slow process of separation of the significant problems from the trivia, from the unknown from the unknowable, of the emergence of the known form the unknown, and of choate mind from the formless inchoate. Scientific progress is informed by hindsight not by futureward vision. Sciences, like all natural phenomena, progress from more primitive states, but not necessarily 'towards' any future or inevitably better state--'products of a process that moved steadily from primitive beginnings but toward no goal.' The evolution of science like the evolution of mind or of nature, is not necessarily goal directed teleology

informed by the progressive evolution of a single essential principle.

"But need there be any such goal? Can we not account for both science's existence and its success in terms of evolution from the community's state of knowledge at any given time? Does it really help to try to imagine that there is some one full, objective, true account of nature and that the proper measure of scientific achievement is the extent to which it brings us closer to that ultimate goal? If we can learn to substitute evolution from what we do know for evolution toward what we wish to know, a number of vexing problems may vanish in the process. Somewhere in this maze, for example must lie the problem of induction." (Kuhn: 177)

In the Kuhnian framework, scientific process in terms of paradigmatic conflict and revolution occurs in a natural way similar to the 'blind evolution' of nature itself. And it is in this sense that this notion of 'achieved progress' in science versus its purported teleological ideology of progress is similar to the idea of the natural evolution of mind and human culture historical movements in the evolutionary emergence of human civilizations

"The analogy that relates the evolution of organisms to the evolution of scientific ideas can be easily be pushed too far. But with respect to the issues of this closing section it is very nearly perfect. The process described in section XII as the resolution of revolutions is the selection of conflict within the scientific community of the fittest way to practice future science. The net result of a sequence of such revolutionary selections, separated by periods of normal research, is the wonderfully adapted set of instruments we call modern scientific knowledge. Successive stages in that developmental process are marked by an increase in articulation and specialization. And the entire process may have occurred as we now suppose biological evolution did, without benefit of a set goal, a permanent fixed scientific truth, of which

each stage in the development of scientific knowledge is a better exemplar." (Kuhn: 173)

Progress is equated with becoming paradigmatic in the sense that scientific knowledge is cumulative, deepening, more exact and specialized and also because its progress serves to unit a community of scholars and provide a sense of shared identity which survives and endures the trials of many revolutions, only to emerge stronger than before. The notion of progress, then, depends upon the relative notion of achievement of paradigmatic unity by a scientific community.

"…We must learn to recognize as case what have ordinarily been take to be effects. If we can do that, the phrases 'scientific progress' and even 'scientific objectivity' may come to be seen in part redundant…Does a field make progress because it is a science, or is it a science because it makes progress?

…Viewed from within any single community, however, whether of scientists or of nonscientists, the result of a successful creative work is progress. How could it be anything else?…No creative school recognizes a category of work that is, on the one hand, a creative success, but is not, on the other hand, an addition to the collective achievement of the group. If we doubt, as many do, that nonscientific fields make progress, that cannot be because individual schools make none. Rather, it must be because there are always competing schools, each of which constantly questions the very foundations of the other. The man who argues that philosophy, for example, had made no progress emphasizes that there are still Aristotelians, not that Aristotelianism has failed to progress." (Kuhn: 162-3)

Kuhn employs the construction of scientific paradigm dichotomously and somewhat dialectically in two senses--the sociological sense of the shared community and a deeper

'metaphysical' sense of paradigms as shared examples based upon past achievements. It is in this dichotomy that the dialectical tension of the notion of scientific paradigms underlying the 'structures' of scientific revolutions and the conception of the progress of science, and it is in resolution of this inherent counterpoint in the construction of this scientific philosophy of 'paradigms' that the door is opened onto the understanding of the role of culture history in the understanding of both the philosophy of science and of the culture history in which this philosophy is embedded and recreated in the sense of 'scientific process as civilization'.

"…On the one hand, it stands for the entire constellation of beliefs, values, techniques and so on shared by the members of a given community. On the other hand, it denotes one sort of element in that constellation, the concrete puzzle solutions which employed as models of examples, can replace explicit rules as a basis for the solution of the remaining puzzles of normal science." (Kuhn: 175)

This tension reflect the dialectics between mind and world view and beingness and non-being in the world, expressed in terms of the critical differences between paradigmatic science as ideology and meta-paradigmatic science as non-ideological unfolding of mindness culture historically situated.

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Kuhn's imprecise, generalistic and rhetorical use of the term 'paradigmatic' to refer to multiply and connotatively to different things simultaneously has given rise to a great deal of controversy in the philosophy of sciences as to what exactly is a 'scientific paradigm' and what renders science paradigmatic and whether if science is even paradigmatic at all. There is a distinction made

between 'pre-paradigmatic', 'post paradigmatic', 'quasi- or semi-paradigmatic, poly-paradigmatic, un-paradigmatic and meta paradigmatic'. Paradigm must be seen as a relativistic conception of science which is multiply and differentially understood from the standpoint of the individual interpreter. From a 'scientific' and rationalistic standpoint this would seem to set the notion of 'paradigm' on shaky ground--a great descriptor perhaps but a poor explainer. But as a generalizing and generalistic conception of scientific praxis as both a social and historical phenomena of shared values and relations, and as a shared set of ideas, symbolisms and 'examples' which serve as substitutes to actual empirical demonstration in the march of science as proof, the notion of paradigm is a necessary way of understanding the culture history of science and its interrelation to mind and world view.

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Ideologically, science shares with Western philosophy its predominating sense of rational idealism, or Platonism, which becomes expressed in several ways in the paradigmatic world of science. First, there is implicitly posited an basic isomorphism, or principle of reflective identity, between eidetic 'structures' or noumenal, a priori principles which are believed to underlie the natural patterning of reality and to provide it with its sense of ordering. It is therefore believed that by understanding and correlating the patterning of natural phenomena this underlying structure of reality can be systematically revealed through rigorous scientific praxis.

Secondly, this structural isomorphism is held to be potentially reflected in a linguistic sense in the denotative relation between term and the thing of the world which it represents. There is thus a possible one to one correspondence between words and their proper definitions and by logical extension between these well defined words and the things which they actually represent in the world. This is the basis for logical and empirical values of positivism which holds that the secret to scientifically unlocking

the hidden structure of reality is in part a problem of proper definition, description and denotation--a linguistic problem of applying the proper words to the proper things in their proper order.

Thirdly, scientific rationalism holds a view of a strict logical dichotomization of the reality of experience--scientific statements and its language follow the principles of logic in making sense of experience. Strict isomorphism and one to one correspondence between the term and the thing demands that there must be an equally strictly enforced law of identity, or of 'non-contradiction of opposites' such that A is A and not B. By extension this leads to the superimposition of two value logic based on the principle of the excluded middle ground--A cannot be both A and not A at the same time. The basis of mathematical logic and syllogistic structures of rationality--abduction, induction and deduction and the implicit hierarchical ordering of general/particular levels of ideas, knowledge, percepts and concepts are rooted in this two value logic of the principle of identity and non-contradiction--either A or not A.

It is from this rationalistic point of view that states that the relations of the universe are ordered by single first principles and that immutable laws which can be precisely stated in proper terms govern the relations of reality. These isomorphic relations are held to be mathematically pure and precise, the reflective relations between terms and things and their logic, is purported to be reflective as well of this mathematical purity and precision.

Such emphasis of two value logic, positivistic correspondence of language and logic, and the structural isomorphism of reality, have other kinds of consequences. One is a search for causality or determination as the basis for both description and explanation of experiential events in the world. Causality may be ultimate or efficient, mechanical, uni-modal or multi-modal, or systemic or uni-directional but in such a viewpoint consequents must always be affirmed by antecedents and in turn consequents confirm antecedents. Principles 'cause' reality to happen--are made, acted upon or created by first principles. Gravity 'causes' the apple to fall from the tree, social anomie causes the high incidence of suicide. It

is from such a rationalistic standpoint that the world view that all change must be someway predetermined, must have a logical cause or rational reason for happening, that the principle of progress is rooted.

Another consequence of this form of rationalism is that it guides our selection and scientific decision making--we use its systematicity as the basis for making choices or determinations which are otherwise difficult or impossible to clearly make. An example of this is the employment of the null hypothesis which posits an arbitrary threshold for 'rejecting' a correlational hypothesis--it guarantees our statistical statements a certain minimum level of probability given the reliability of the sample and the relevance of its definitions.

Other scientific standards which have become the bulwarks of its methodological dogmas follow from this strict rationalism. The principle of experimental control, repeatability, non-tautological falsifiability of its statements, of validity of empirical evidence and the reliability of the non-arbitrary measures.

As they stand, all of these standards are necessary to the paradigmatic and progressive success of science--but the question remains as to whether these ideals of scientific method are actual procedural outlines for scientific praxis or whether scientific praxis itself on an everyday level does not also involve something more or less and rationalistic as the ideology of pure science claims for itself.

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The two value dichotomization of the rational reality of science between a predetermined 'is' or existence and an undeterminable 'isn't' or nonexistence is reflected as well in the metaphysical and epistemological dichotomization of science between natural phenomena, which are held to be amenable to scientific standards and measures--as 'events in the real world'--and supernatural

experiences--collective beliefs, statements, claims, associations in the world, which are unamenable to direct empirical substantiation and therefore are also superficially unprovable. A permutation of this kind of dichotomy is between the secular and religious world view of science and the non-secular ideological and religious world view which s basically non-scientific in orientation. This kind of dichotomization and its sense of dualism of reality between material and ideal, the real and normal, the sacred and the secular, is fundamental and distinctive of the world view of science.

This kind of scientific world view becomes reflected in the principle of scientific progress as a dialectical movement toward the expression of perfect principle and in the dichotomization between 'primitive mentality' as basically 'pre-logical', 'irrational', 'third value', concrete, analogical. Mythical and magical and the 'rational' mentality of civilized man which is scientific, logical, causal, statistical and correlational rather than analogical.

It is from such an orientation that we can see the basic world view of science which is both paradigmatic and yet nonetheless maintains itself as essentially 'non-ideological'.

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The structural rationalism of the world view of science has been criticized on the basis of several interrelated points. In general, it is held that the exclusive and restrictive nature of such rationalism precludes the consideration of alternative possibilities of relativistic contexts and of complication 'in-between' factors which go unexplained in its terse symmetry of words and worlds. It generally fails to account for the dilemmas imposed by inter-relational factors and context. Its pre-selective mode of experiencing human reality is held to be even operative at the basic phenomenological level of observation and perception of events--how we literally 'see' the world is literally preconditioned by the words with which we define the world. Structural rationalism and its dialectical corollary of strict empiricism cannot deal well with

the dilemmas imposed by contextuality and relativity of event 'horizons' in the world.

The apparent, inferred isomorphism between apodictic, ontological structures expressible in terms of universal logos or ordering principles and the actual patterning of events in the world is itself a hypothetical and 'unfalsifiable' presupposition of the 'top down' and hierarchical arrangement of relations in the world. The theory of evolution as a so called 'hypothetico deductive' approach which was nevertheless built upon years of detailed 'inductive' observation, remains a fitting example of the inherent inadequacy of presumed universal principles to adequately or completely explain the diversity of phenomena under its purview. The theory of evolution remains a great orienting paradigm in the understanding of nature, yet its actual principles of transformation and change remains imprecisely defined and for the most part still presumed.

A similar rationalistic fallacy is the strict compartmentalization of the meaning between the denotative and the connotative and the positioning of a precise, mechanical and mathematical relationship between the term and the thing it purportedly represents. This has long been an linguistic ideology of the creation of a 'pure' language which is inherently simplifying and self explanatory of the events it describes, which has long predated the arrival of modern scientific method.

The third fallacy of this rationalism is that events of nature are always ordered in a logically consistent and coherent manner--that discovery of the proper terms designating such events and relations between things also explicates their natural order and process of occurrence. In this regard, our two value Truth Theorem logic is rather itself artificial and superimposed upon a natural universe of relations rather than immanent from within the patterns of relationships themselves. In this regard the principle of absolute identity is seen as exclusive of the possibility of alternative identities or multiple profiles of the same thing across space or through time. Connected with this is the hypostatization of the word for the thing--seeking identity in the abstract sense of a class of taxon of things superimposed upon the actual individual

variations of its component entities. Also, many experiences, as process of events, rather than as 'things' to be reified, are structurally indeterminant. The principles of the excluded middle ground of meaning does not always work in the consideration of the phenomenological flow of experience and in the alternative ways that we may parse our realities into different shapes, sizes and forms.

It follows from such 'syllogistic fallacies' that our imputations of 'causality' to the natural flow of events might also be fundamentally spurious and distortion of the natural relations transformations involved in 'event structures' of reality.

Our 'systems' of causality themselves might be essentially 'over determined' and teleologically over determining. It superimposes a fundamentally hierarchical categorization of our reality which in turn leads to a 'monothetic' and 'monothematic' conception of a rational reality to the ignoring of the polythetic structure and relational composition of events in reality.

Similarly, our rational decision making 'systems' of causation allows our 'systems' to make the evaluative, normative and indefinite decisions in 'uncertainty reduction' for us based upon predefined criteria of selection. We no longer need to recognize reflexively our own part in the decision making process but can better accept the illusion that the 'theory' or the system is actually doing our work and making the decisions for us.

Similarly, our efforts to superimpose experimental control may lead to our unacknowledged 'control' of events and our efforts to standardize or make reliable and replicable the empirical results of our experiments may lead to failure to recognize our own hands in reconstructing the conditions for such experiments.

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All of these points towards a surreptitious ideological function of our non-ideological methodologies of 'pure science' and to the unreflexive self denial of persuasive, rhetorical, paradigmatic role of language, method, belief and value in scientific praxis. It is the failure of science to recognize and respond to its own ideological function in the world which is the shortcoming of its methodological praxis.

Hans-Georg Cadamer writes about human understanding itself as an episodic and 'trans-subjective' linguistic process--an 'event' or the fusion of 'horizons' in the act of communication. The hermeneutics of the language process is seen as universal and as therefore underlying all attempts at understanding the world. The general frame of philosophical hermeneutics underlies all form of knowledge in the world, whether individual or social. Knowledge springs from the linguistically and contemporaneous of all human experience in the world. The relationship of rhetoric to hermeneutics represents the 'positive' side of hermeneutical interpretation. Rhetoric and hermeneutic interpretation are deeply interwoven in the understanding and knowledge of science--in the 'sociality' of human existence. The praxis of all three represents a challenge to claims of scientificity of knowledge. Rhetoric appeals to ordinary 'natural' reason in its claim of probable verisimilitude as opposed to the scientific claim of demonstrable truth. Ultimately, all understanding and interpretation proceeds from this rhetorical call to reason, as does ultimately scientific method as well. The rhetorical function of convincing and persuading extends its scope to take in universally all human understanding--scientific as well. It is in particular regard to this hermeneutic and rhetorical universality of its 'linguisticality' that the intential alienation and 'distancing present' of the logic of science is critiqued. The 'positivistic ossification' of the sciences stems from its failure to reflect upon its own linguistic foundations.

Science raises the claim of transcending 'pre-scientific' universality of the hermeneutic experience by 'methodical and controlled alienation'. Self reflective consciousness of the hermeneutic problem seeks awareness of prejudices and pre-understandings which undermines scientific positivism. The role of the observer cannot be effectively separated from the on going process of the

event itself to allow 'objective'--non-hermeneutic appropriation of the independent meaning of the event. The observer's own relationship with the even becomes denied.

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The 'achieved progress' of scientific understanding of the world proceeds inspite of its rationalism and its methodologies and not because of them. The principles and processes which actually inform the everyday praxis of science and its normal and revolutionary unfolding is something quite different from what its rational idealism and positivism purports it to be. By and large, its regular routines and methodical rituals are but the self sustaining illusions of it is own ideology and teleology in the world. But this ritual and the mythology and ideology which informs it are perhaps necessarily in the unfolding culture historical dialectic of its development.

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In defining paradigms and in describing the process of how students of science learn their 'puzzle solving' by learning to see 'the same gestalt as other members of his specialist's group' and by assimilating 'a time tested and group licensed way of seeing', Thomas Kuhn refers to the role of 'acquired similarity relations' in the history of science in which 'scientists solve puzzles by modeling them on previous puzzle solutions…' He refers to the 'tacit' and 'consequential' knowledge 'learned by doing science rather than by acquiring rules for doing its' and 'thereafter embodied in a way of viewing physical situations rather than in rules or laws.'

"When I speak of knowledge embedded in shared exemplars I am not referring to a mode of knowing that is less systematic or less analyzable than knowledge embedded in rules, laws or criteria of identification. Instead I have in mind a manner of knowing which is misconstructed if reconstructed in terms of rules that are first abstracted from exemplars and thereafter function in their stead." (Kuhn:193)

Members of two groups who have learned to see the same situations differently, who 'have systematically different sensations on receipt of the same stimuli, do in some sense live in different worlds.' Members of the same community in order to communicate with one another effectively, must share in the same sets of sensations, but with differentiation and specialization between groups, there are different kinds of sensations operating. Returning to the notion of paradigm as shared exemplar, it is a fundamental mechanism by which members of a group 'whether an entire culture or a specialist's sub-community' learn to see the same things when confronted with the same stimuli. What is being acquired are not necessarily the rules and the ability to use these rules:

"…That description is tempting because our seeing a situation as like ones we have encountered before must be the result of neural processing, fully governed by physical and chemical laws. In this sense, once we have learned to do it, recognition of similarity must be as fully systematic as the beating of our hearts. But that very parallel suggests that recognition may also be involuntary, a process over which we have no control. If it is, then we may not properly conceive it as something we manage by applying rules and criteria. To speak of it in those terms implies that we have access to alternatives, that we might, for example, have disobeyed a rule, or misapplied a criterion, or experimented with some other way of seeing. Those, I take it, are just the sorts of things we cannot do.

Or, more precisely, those are things we cannot do until after we have a sensation, perceived something. Then we do often seek criteria and put them to use. Then we may engage in interpretation, a deliberative process by which we choose among alternatives as we do not in perception itself…

These are all deliberative processes and in them we do seek and deploy criteria and rules. We try, that is, to interpret sensations already at hand, to analyze what is for us the given. …But the fact that the system obeys the same laws in all three cases provides no reason to suppose that our neural apparatus is programmed to operate the same way in interpretation as in perception or in either as in the beating of our hearts. What I have been opposing in this book is therefore the attempt, traditional since Descarte but not before, to analyze perception as an interpretative process, as an unconscious version of what we do after we have perceived.

What makes the integrity of perception worth emphasizing is, of course, that so much past experience is embodied in the neural apparatus that transforms stimuli to sensations. An appropriately programmed perceptual mechanism has survival value…It is just because so very few ways of seeing will do that the ones that have withstood the tests of group use are worth transmitting from generation to generation. Equally, it is because they have been selected for their success over historic time that we must speak of the experience and knowledge of nature embedded in the stimulus to sensation route.

…We have no direct access to what it is we know, no rules or generalizations with which to express this knowledge. Rules which could supply that access would refer to stimuli not sensations and stimuli we can know only through elaborate theory. In its absence the knowledge embedded in the stimulus to sensation route remains tacit." (Kuhn: 195-6)

"In both literal and metaphorical senses, 'seeing' as interpretation begins where 'seeing' as perception ends--'the two processes are not the same, and what perception leaves for interpretation to

complete depends drastically on the nature and amount of prior experience and training." (page 198)

"Paradigmatic version of normal scientific praxis depends upon the shared ability of things and

relations into 'similarity sets' which are primitive in the sense that the grouping is done without an answer to the question, 'similar with respect to what?' Communication based upon acceptance of a shared set of values, shared experiences, and ways of seeing allows a group to make decisions between choices 'to ensure that most members of the group will ultimately find one set of arguments rather than another decisive.' Revolution changes the 'similarity relations'. Members sharing the same linguistic code begin using their words differently. Group communication breaks down and the corporate identity of the community is threatened. Alternative choice of theory will become the focus of such breakdown--'not surprisingly, therefore, when such redistribution occur, two men whose disclosure had previously proceeded with apparently full understanding may suddenly find themselves responding to the same stimulus with incompatible descriptions and generalizations…" (page 201)

"Briefly put, what the participants in a communication breakdown can do is recognize each other as members of different language communities and then become translators. Taking the differences between their own intra- and inter-group discourse as itself a subject for study, they can first attempt to discover the terms and locations that used unproblematically within each community, are nevertheless foci of trouble for inter-group discussions…

Since translation, if pursued, allows the participants in a communication breakdown to experience vicariously something of the merits and defects of each others points of view, it is a potent tool both for persuasion and for conversion. But even persuasion need not succeed, and , if it does, it need not be accompanied or followed by conversion. The two experiences are not the same…" (Kuhn: 202-3)

"The conversion experience that I have likened to a gestalt switch remains, therefore, at the heart of the revolutionary process. Good reasons for choice provide motives for conversion and a climate in which it is more likely to occur. Translation may, in addition, provide points of entry for the neural re-programming that, however inscrutable at this time, must underlie conversion. But neither good reasons nor translation constitute conversion, and it is that process we must explicate in order to understand an essential sort of scientific change." (page 205)

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What it is that scientist regularly do, and what normally happens in science, is perhaps something quite different in everyday praxis than is implied by the reiteration of its rules and symbolic generationalizations. It is must less formal and rationalistic than hitherto presumed to be and involves a level of selectivity, perhaps automatic and reflexive, that is becomes a matter of perception and ads a mode of experiencing reality is fundamental as a way of seeing and representing reality.

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Science is about knowledge, as ordered experience, which is expressible symbolically. Our scientific knowledge enables us to make 'sense' of our experiences by relating them symbolically to similar sets of experience. Our scientific knowledge does so in precise and predictable ways.

Science addresses the unknown--the unknown are the all the possible experiences which exist beyond our knowledge--those

sets of our experiences. The unknown exists beyond the horizon of our experience, either individually or collectively. It is normally inaccessible to our senses because it continuously presents us with anomalies of experience which do not fit our 'paradigms'. The process of science consists of filling in the gaps or the gulf between the known, the experienced, and the unknown, or yet to be experienced. We 'uncover' the known from the unknown by bringing new experiences into alignment with old experiences. We learn from the unknown by the expansion of our horizons of experience.

Collectively, science represents a movement from the unknown to the known, in the process separating out the inherently 'unknowable' (i.e. unverifiable, unfalsifiable, unanswerable) from the simply relatively unknown. What is unknowable becomes separated out and falls by the wayside of scientific interest as impossible and what is simply, relatively unknown moves gradually into the light of our previous experience and thereby becomes known or learned by science.

It is by such a process that science has been expanding the horizons of our known world, systematically excluding and eliminating the ultimately unknowable, and thereby increasing the fund of our experience of the world. Our science has been moving simultaneously in two directions--it has been sorting our the unknowable from the unknown, and has been moving the unknown into the domain of the known.

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The process of sorting out the unknowable from the unknown is also a process of distinguishing between the impossible and the possible. What is determined to be impossible or possible is largely a function of the known--of previous experience.

Movement from the simple unknown to the known is a gradual movement from possibility to plausibility and then to probability--

knowledge emerges in ever more solid and definite proportions. What becomes knowledge emerges full blown into the world as the difference between what is and what is not--what exists in fact and what only potentially exists as remaining possibility. As we acquire knowledge it becomes a part of our experience--the process of bringing something into full knowledge is the process of fully and finally experiencing something as a 'thing' or a relation in the world.

Movement from possibility through plausibility into probability is a stepwise process of selective determination characterized by diminishing degrees of freedom and increasing degrees of relational contingency or contextuality. A thing becomes known in the world by becoming or being recognized as being fully, completely situated in the world within a broader, more general framework of understanding.

Such a movement towards greater degrees of likelihood of knowledge is a decision making or normative or interpretive process that requires increasing degrees of selecting the unlikely or implausible from the more likely and plausible.

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Such a movement from the unknown to the known is an 'inference making' process which bring a 'thing' or a relation between things from the imaginary world of the merely possible into the real world of what is--into the world of 'reference'. Scientific knowledge represents then, a movement from inference to reference, by the superimposition of our previous, paradigmatic frames of experience upon our new environments of possible experience.

Inference making is a process of making predictions of possible experience on the basis of previous experience and on the basis of perceived contextual outlines of present experience--clues and

circumstantial evidences which surround and negatively define the outlines of the unknown.

We 'encounter' the unknown in reflexive recognition of our experiences with it. Science rooted in the experience of beingness is oriented toward the encounter with new environments--science based upon the defense of non-being is rooted in the reflective reinforcement of past experience.

Our reflexive recognition of the unknown creates possibility--it opens the doors of conscious awareness upon the alternative realities.

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The inference function of science sees its praxis and function as being one primarily of problem posing rather than 'puzzle solving' or paradox resolving, and as one of question asking rather than of question answering. The power of science lies in its ability to create possibilities and to eliminate impossibilities--it rests in its ability to ask question of reality in such a reflexive manner that it creates a gap in understanding awareness or knowledge which then must be filled in a sufficient way. To ask a question is to pose a statement in such a way that it expects a response, a reaction and is left incomplete without such an answer.

The success of science depends upon asking the right questions in the right way, such that the answers fitting these questions must appear as either correct or incorrect.

Asking questions appropriately frames reality in an experientially open way, such that present experiences can then be 'determined' according to their fit or non-fit.

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It must be asked whether in the scientific movement from the unknown to the known, it is prediction which is the actual value of its success--the ability to make correct inferences regarding future experiences or events, or whether it is more a matter of expectation--such that previous frames of experience predispose us to experience new events in certain 'predictable' or expected ways, which, if aberrant from our frames of expectation, lead to frame disruption and reevaluation. Science is involved in constructing and reconstructing general frames of reference/inference which create specific sets of expectations regarding the behavior of natural phenomena and which are evaluated by the 'accuracy' of its 'predictions'. Science is successful if its experiential frames of expectation are correctly fulfilled--if it eventuates in greater predictability--hence knowability--of experience.

If events do not perform according to our scientific predictions, it opens up the door to the unknown and poses a problem which science then needs to adequately resolve. Scientific frames of expectation, based upon the knowledge of previous experiences, become disrupted by the anomalousness of new events.

If the value of a science rooted in the experience of beingness is one of problem posing rather than puzzle solving, or in question asking, in elucidating the unknown, then it follows that its primary value is not so much one of prediction or expectation rather than one of discovering anomaly and unpredictability of phenomena. The value of scientific knowledge is not in the pattern recognition of its knowledge, or in the reinforcement of its frames of expectation so much as it is engaged on a search, or a quest for the unknown, for the anomaly and the exception to the rule.

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To define, as Thomas Kuhn does, scientific praxis as primarily one of puzzle solving entails a very systematic, and perhaps

stereotypical view of scientific method in which the solutions or answers to the problems are 'out there' or already waiting to be discovered, rather than be 'created' or 'formulated' as symbolic generalization. Puzzles are characterized by the singularity and correctness of their unequivocal resolution--there is only a single right answer and this answer already exists in the proper arrangement of the pieces or parts of its problem or pattern. It is to be wondered whether this some one simplifying 'structure' of scientific praxis is not rather more reflective of an particular 'attitude' which is perfectionistic and unduly rationalistic in a monothetic sense. It is also to be wondered whether such an attitude doesn't unnecessarily restrict the range of scientific interest to the range of the known, of what is, rather than to the openness and possibility of the unknown. Again, puzzle solving emphasizes pattern recognition and reinforcement versus frame disruption.

'Paradox resolving' or 'dilemma debating' focuses upon the uncertainty inherent to open science and to its basically linguistic praxis which is basically dialectical. Paradoxes and dilemmas, unlike puzzles are characterized by the vagueness and possibility of multiple solutions or of contradictory answers. The problem posed by paradox and dilemma are open to interpretive process and are complicated in their systemic interrelationships. Dilemmas and paradoxes are also characterized by partial and imperfect and incompatible answers.

Paradox and dilemma might seem more the provenience of literature and philosophy than of science, but the natural order of events in the physical universe are fraught with as much paradox and dilemma for its human knowers as it is filled with puzzles and riddles waiting to be filled in with the missing pieces. To say the world is ultimately one of paradox rather than puzzle is to perhaps deny a final ground of knowledge which is empirically and rationally undeniable and unquestionable--but it does not necessarily deny the relative possibility and probability for such ground of experiential knowledge in reality.

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It is also to be wondered whether science can ever really answer a problem in a truly 'falsifiable' manner, or whether its inherent openness and possibility always guarantees its partial and relative statements a degree of methodological immunity from experimental falsification. Are not all statements in science ultimately unfalsifiable to the extent that they are based upon limited sets of experience in potentially unlimited possible realities.

Falsification is a sophisticated but spurious positivistic value of scientific praxis. We can never know whether the thousand and first swan will be black or white, no matter what the statistical probabilities based upon our previous experiential samples.

It does not matter whether scientific statements made are falsifiable or ultimately unfalsifiable or whether more logically they are amenable to empirical, experimental validation or not, or whether they are ultimately verifiable or validity testing. But it does matter whether scientific statements made do become falsified by later experiences or become set canons of truth which remains consistently revalidated by subsequent experiences. It also matters whether subsequent validation of falsification is dependent upon previous frames of experience or arise 'independently' of these frames of experience. In other words, it matters whether scientific statements are non-teleological or not in reality.

It is to be wondered whether the relative values of openness of scientific praxis and independence if its results are not more important than such notions of 'falsification'. The strength of science rests in the repeatability of its results and in commensurability and verifiability of its standard measures and indexes. It is important that scientific praxis not be a closed tautological system in which its results verify and in turn become verified by its theory in any 'self evident' way. It is also important that such systems not be dependent for their verification on preexisting conditions or predetermining relationships of power in which its theory is situated.

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This also leads to the question of what actually constitutes proof or disproof in science other than in a sense of statistical incidence. Does experimental demonstration necessarily prove or disprove the theory by which it was designed--or do not the tacit pre-understandings and generalistic presuppositions underlying the theoretical design in a sense predetermine the outcome of the demonstration. If we can never know what the next toss of the coin will be, and if we cannot therefore either make falsifiable, 'non-ideological' statements, then how can we ever know with absolute certainty whether our scientific knowledge is proven or disproven by our experiences. Like puzzles, proof depends upon the preexistence of a single 'correct' solution to a problem and are therefore mathematical in their accuracy and precision. Science values supremely accuracy and precision of its statements and always emulates mathematics as 'pure theory' but its proofs and disproofs must always remain based upon tacit, speculative and tentative foundations of the interpretation of what its experience really means.

Because there are no non-relative proofs or disproofs there are no absolute right or wrongs in the knowledge of science, but there are only statements which are more or less accurate, precise and certain which become the symbolic generalizations of scientific laws and principles.

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The rereading of Thomas Kuhn reveals that general scientific knowledge deals with relational statements adhering between things rather than definitional statements about things. In making generalistic statements science can be said to be a system of generalization dealing with experiential reality and as such it is subject to the same kinds of constraints as are any other kind of

system of symbolic generalization. It is not the correctness or rightness of such a system, but its consistency in generally explaining the relationships and events between things in reality by which such a system is evaluated.

Not being definitional in orientation, it can be said that science as a system of symbolic generalization is not concerned so much with the description of things so much as the 'explanation' of the relations which occur between things. Things can be defined or described, but relations are not so much described as explained. Systems of symbolization which are basically descriptive and definitional are in a sense linguistically unlimited in the amount of context or detail which can be included in its statements. Systems of symbolization focused primarily upon relational statements are constrained in certain ways by basic relational rules. Where definitions can be expanded and descriptions can afford to wax lyrical, explanations of the relations between things cannot afford the same kind of surplus of meaning.

It can be said that such relational systems of symbolization being primarily explanatory rather than merely descriptive are constrained by certain rules of efficiency and sufficiency which are not subject to the same kind of metaphorical looseness and flexibility as are descriptive systems. Such rules are non-arbitrary in the sense that their application is not governed by the same normative or subjective criteria as are descriptive statements, but are considered generally 'necessary' in the understanding of the relatedness between things in the world.

It is an interesting twist of philosophical rationality which sees science as the production of 'prescriptive' statements rather than of 'descriptive statements' and in the process of its prediction, deriving and 'ought' from an 'is'. But in its explanatory symbolism and relational prescriptiveness about the world, this is exactly what the praxis of science in the world actually is.

Another way of considering this difference is to understand the role of description as basically referential knowledge and the role of explanation as being basically inferential. In reality, the difference between description and explanation and between references and inference is not so basic or clear cut as such a

simplistic dichotomization would make it seem. Explanation is always at least implicitly based upon preliminary description, and is itself a form of restricted description, and inference always depend upon the presence of a referential context for its predictive success. In a similar way, the philosophical dichotomization between descriptive and prescriptive statements and between analytical and synthetic statements, is not in reality so clear cut or convenient as it would rationalistically seem. All description as interpretation of phenomena is latently, implicitly selective and prescriptive--its statements are always tacitly loaded with value, and all prescription as normative judgment is always based at least implicitly upon descriptive interpretations of things in the world.

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Another way of considering is to consider statements of increasing levels of generality--from the very concrete to the very general, and of the problem of maintaining general consistency with the ascending orders of generality. (This is the rose, etc.) There occurs a general shift in such an ascent from basically descriptive to prescriptive statements, but it remains difficult where exactly to draw the line at when a 'middle level' statement stops being the one and becomes the other.

Similarly, when we ask when and where questions we are dealing with points of time and coordinates on maps which are very exact in their descriptive accuracy. When we approach what and who questions of description we become a little less precise in the plotting of our graphs. Then we ask how questions and though we can give some definite mechanical kinds of answers, the margins of our statements remain nevertheless well defined and more imprecise and open to alternative interpretation. Finally when we come to 'why' questions we leave description completely behind us as no longer satisfactory and must proffer very general and vague statements which seek to explain.

Ultimately, science as explanations is involved foremost with asking why questions, though its many 'puzzle solutions' are frequently framed in terms of 'how' responses. How and why questions ask about the relations between things and leave behind the descriptive definition of what or where and when things as already given.

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Objectivity is another value of scientific positivism and rationalism which remains as an unquestioned but vaguely defined precept of its praxis. In general 'objectivity' is contrasted with 'subjectiveness'. Objectivism is a philosophical doctrine stressing the objective reality of all that is known or perceived. Such objective reality refers to 'anything external to or independent of the mind; real; actual' or 'having to do with a known or perceived object as distinguished from something existing only in the mind of the subject, or person thinking'. Metaphorically it also refers to being without bias or prejudice, being the aim or goal, detached, impersonal or determined by and emphasizing the features and characteristics of the object or thing dealt with, rather than the thoughts, feelings, etc., of the artist, writer or speaker. From the standpoint of science all of these connotations are fitting and we may refer to the normal scientist as having an 'objective frame of mind.'

Methodologically scientific objectivity rests upon the reliability and repeatability of its experiments and its 'proofs' and in a more basic sense, in the universal commensurability of its basic standards of measurement by which it defines and describes experiential events in discrete, non-arbitrary ways.

But it must again be asked whether it is the actual objectivity of the observations and statements made upon which science rests empirically, or if what is actually happening is some other kind of phenomena which becomes distinguished as 'objectiveness'. Part of the answer to this rests in distinguishing the critical differences

between 'inter-subjectivity' as a core value of science versus 'objectivity' and in seeing how these are rooted in the linguistically of the production of scientific statements and of the function of such statements to communicate information in a theoretically as open a way as possible.

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The difference between objectivity and 'inter-subjectivity' is the difference between etic and emic or roughly the outsider's versus the insider's point of view. This dichotomy is in a sense spurious, because in fact the etic, 'objective' point of view is but the 'emics of the observer'. What we are left with is the inter-subjectivity of a community sharing a set of viewpoints, value orientations, beliefs and even experiences of reality. Objectivity remains a 'pure' ideal state--perhaps unattainable--of 'alienated subjectivity'. Inter-subjectivity is a kind of empathetic relational communion between people--based upon common experiential encounter. The problem of objectivity and inter-subjectivity are part of the problem of the interpretation of reality of the determination metaphorical salience and metaphysical relevance in the reading of the signs of the environment, and in the inter-translations of different interpretations of the same reality which have different topographies of 'mindscape'. Another related problem is the 'dilemma of context'--the problem of deciding how much or how little context is important to be included or excluded in the understanding of something. Objectivity posits the possibility of a single correct interpretation of reality, and of a single correct etic translation of this interpretation, in comparison with which all other 'subjective' versions are imperfect and distorted.

The dilemma of the 'objective' standpoint is that it is self reflective of its own embedded and tacit value orientations yet it is non-reflexive of its own role in the interpretation and translation of reality in the same way that 'inter-subjectivity' is necessarily reflexive. Inter-subjectivity is also based upon a fusion of

phenomenological horizons which are subjectively determined of both the individual and the collective.

Inter-subjectivity is based upon the understanding of its own linguistically in the knowledge of science, while objectivity represents a denial of this linguisticality. Objectivity superimposes a single hierarchical order upon our collective conception of reality by justifying a single correct interpretation of its rules and laws. Inter-subjectivity unites a community at a more basic level of common perceptions, experiences and pre-understandings.

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The purpose of the value of inter-subjectivity and of relational explanation of symbolic generalization of science is to facilitate communication of scientific information within a community to enhance the 'survival value' of that society. The communication of shared experience as the basis of scientific knowledge represents the primary criteria of scientific understanding--if a theory is phrased in language which prevents communication of its relevant scientific content in as broad and trans-linguistic context as possible, or of its own distorted or propagandized for purposes of persuasion, then scientific suffers from a condition of its own tautological scientificity. Science must always be stated in terms of a virtually open system of symbolic communication. The real proof or disproof of scientific knowledge is in its communicative efficacy--if it facilitates a sharing of experience, hence scientific knowledge in the world.

It is this communicative function of scientific language imposes the constraints of efficiency and sufficiency upon scientific explanation of relational phenomena in the world. The inherently limited channel capacity of any symbolism, word, phrase to convey the essentially unknowable. Scientific advancement in theory and knowledge has not just become more reflexively realistic but it has in a basic sense, created and expanded reality itself to become larger and more encompassing. It has not just

excoriated the unknown, but it has systematically exorcised the unknowable.

It in this sense that our worlds today are fuller of knowledge and greater of vision and possibility that were the worlds of our distant ancestors. We see further and deeper into the nature of reality of which we ourselves are inextricably a part.

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Science can be looked at an on-going dialectical debate between the rational and the empirical and between the 'objective' and the phenomenological. As such there is a continual movement between generals and particulars, between etic and emic awareness, between things and their relations and the term for things and their relations.

A thesis is not expounded that is not soon challenged by counter evidence--a usual way of seeing new evidence is not long without competition from alternative points of view.

It is from this continuous and unending dialectic that the paradigms and models of the world of science has gradually taken solid, distinctive shape in our world and though it is always growing and changing--its general form and outline have achieved a degree of consistency and constancy such that it can be talked about with a degree of certitude that it will not soon become unrecognizably altered.

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(THE FOLLOWING CHAPTER BEGINS ON PAGE 417. THERE ARE SENTENCES MISSING …….) relevant

information necessary to an understanding of why something happened in the world entails the strictest most succinct and concise statements which summarize in as few words as possible the necessary conditions and characteristics determining a relationship, while leaving as implicit only the descriptive pre-understandings that are taken for granted in an inter-subjective context of collective understanding. Such minimalization of redundancy and optimization of carrying capacity is the communication of its formalized, symbolically generalized, experiential understanding enables science to communicate its conceptual understanding of the world to as broad and as exotic an audience as possible, and eliminates the risk of error and misunderstanding in the transmission of its information.

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The scientific goals of progressive knowledge of the world or increased accuracy and predictability and control over the world, must also be brought into question as the rationalistic, versus the actual 'purpose' of scientific praxis. A closer look reveals that what science has accomplished is a gradual enlargement of our perceived worlds, albeit indirectly through its instrumentation and a refinement of the precision of our understanding of the nature of relationships in the world. A spin off of applied science has been literarily an expansion of our world through the creation of new things and possibilities. In other words, the progress of scientific praxis is to be measured in terms of how much it has expanded our experiential horizons of the world, both individually and collectively and by how much it has modified our vision of this world through the progressive excoriation of the known from the unknown and the reductive elimination of the (THIS IS THE LAST CHAPTER ON PAGE 417. THERE ARE MISSING SENTENCES…)

It is from this perspective of science as culture historical dialectic that we can see the rise of science as the primary sense making paradigm of our modern world. Its function is to make sense of our world as a special mode of experience of the world. It orders our

'senses' and our sensibilities. It provides consistency to our perception and sensitivity to our experience of the world.

As sense, we can speak of both the physical meaning of sensation, the psychological meaning of perception and conception and the metaphorical meaning of 'seeing' and the metaphysical meaning of 'understanding'. As science carries our knowledge from the possible to the probable and our statements from the particular to the general, and our questions from the descriptive when and where to the explanative why, so also does it carry our 'senses' (beingness) of the world, from the sensate stimuli through the levels of perceptual experience to the order of abstract conceptuality and the imagination of possibility. And in this movement of sense it is difficult if not impossible to tell when the 'objective' sense of the world leaves off and the 'subjective' sense of our own interpretation of the world takes over.

As symbolic process, science works in both directions at the same time, and the synthesis of its dialectic is primarily in terms of its special symbolic generalization. Science as symbolization integrates our world for us at all levels of sense. As a system of symbolization, science is also primarily a verbal and literal world of language--its synthesizing, integrative function of our reality is fundamental to its linguisticality.

Science was not latent in the objective world as an a priori possibility waiting to become discovered and realized by humankind--humankind created science through the deployment of its language to intermediate its understanding and vision of its reality. Science, like mind of which it is an expression, is reflexive and representative of this reality in a symbolic sense, as models and metaphors, but it is not necessarily preexistent in this reality.

The worst ideological delusion science can promote is to confuse its scientific versions of the world for the world itself.

As a sense making system of understanding our world, science is primarily symbolic and it partakes of the capacity of human

symbolization to function simultaneously upon several 'levels' of experience in an integrated synthetic manner.

It is from the standpoint of dialectical symbolism that science and culture history can be seen to share in the unity of the mind. It is not too much to suggest that science and its advancement was likely, if not inevitable, outcome of the processual patterning of human civilization and that it has become symbolically the most direct expression and realization of human mindness that we now have. In a sense similar to mythology and culture history, science is the voice and sense of mindness in the world, when it is disinvested of its ideology and non-being of its rationalizing paradigmatics.

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It is not without relevance that the dictionary's definition of 'sense' reflects the ascending levels of its scientific experience. '1. The ability of the nerves and brain to receive and react to stimuli, as light, sound, impact, constriction, etc.; 2. The senses considered as a total function of the bodily organism; 3. Feeling impression, perception, or recognition, either through the senses or through the intellect, awareness; 4. An ability to judge, distinguish or estimate external conditions; 5. An ability to feel, appreciate, understand or comprehend some quality; 6. An ability to think or reason soundly, normal intelligence and judgment, often as reflected in behavior; 7. Meaning; especially any of several meanings conveyed by or attributed to the same word or phrase; 8. Essential signification; 9. Soundness of judgment or reasoning; 10. Something wise, sound or reasonable; 11. The general opinion, sentiment or attitude of a group.'

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In understanding the communicative and inter-subjective criteria of science, it is important to understand the collective notion of 'sense' as both 'common sense' and seeking a 'consensus' about the world. It is the precision and hypothetical replicability of the instrumentality of science which enables a general consensus to be reached in the widest context of signification and symbolization as possible. Its symbolic generalizations are held to be 'trans-linguistic' and 'meta-linguistic' in the sense that they stand above the condition of language as human universals--its laws can be interpreted and translated into any language.

To claim that science, as a collective, corporate enterprise of the scientific community, is basically rooted in common sense and the goal of consensus, is not without some qualification, as the very danger of the paradigmatic ideology of scientism also is founded upon the 'common sense' and 'consensus' cultivating functions which scientific praxis inevitably eventuates in.

"It is not always appreciated that the problem of theory building is a constant interaction between constructing laws and finding an appropriate set of descriptive state variables (units) such that laws can be constructed. We cannot go out and describe the world in any old way we please and then sit back and demand that an explanatory and predictive theory be built on that description…That is not to say that there is an insoluble contradiction. Rather there is a process of trial and synthesis going on…in which both state descriptions and laws are being fitted together." (Lewontin: 1974a:8)

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A dialectical tension in science has been emphasized between time like historical approaches which emphasize why explanation, ultimate causation and dynamic change and space like a historical approaches which are systemic, functional, how descriptive,

nomothetic, proximate cause and 'essentialist' in orientation. Space like systems of science assume a universal homogeneity, while the time like science does not assume that reality is unified as a system but rather it has directionality of development. 'In such a view, phenomena cannot exist as bounded, a priori entities, but are always in a process of becoming. Time like sciences are relational rather than 'thing' oriented. 'Relations cannot be rendered as timeless universally true statements among entities, because there is no constant set of entities…' 'The absence of a periodic table in such sciences is not a function of disciplinary youth; it is a function of their ontological status…'

"The absence of discrete, bonded, empirically meaningful entities in one view, and their presence in the other, have a profound influence in all aspects of science. The notion of nomothetic science is clearly founded in a space like conception of reality, and physics is the prime example of such a science. It is not at all so obvious what it means to be nomothetic within a time like framework. To be universally true, classical laws requires units that are independent of time and space. Clearly, laws of this sort cannot exist at the same level in time like sciences (e.g., Popper 1963). Attempts to generate such statements result in empirical generalizations which can be shown to be false a priori, and obscure the variability that the time like conception is designed to make accessible. This is not to say that laws are impossible in time like frames, or that time like sciences cannot be nomothetic, only that the substantive terms must be different and that efforts to construct laws strictly on models derived from physics are wasted. Only one grand theory of this sort exists--Darwinian evolution. Here, 'laws' attend how things change, not how they interact. It could be no other way." (Dunnell, 1982)

Historical 'time like' sciences are a more general and encompassing order of science that are the 'space like' sciences. Historical sciences embrace a historical sciences in much the way that mind embraces world view. What is seen as ideologically 'non-ideological' about science is its construction primarily following

the examples of a 'space like' physics. Though science in general is more 'comprehensive' at a 'time like' order of generalization, it is also less precise and exacting as are the 'space like' sciences.

Science as Kuhnian paradigms is primarily 'space like' in orientation. Only the theory of evolution so far consists of a 'time like' metaphysics of science, and it is so far incomplete and partial.

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Common sense is fundamental to human culture history--it defines the horizon of our sense making capacity. It may be referred to as an 'ethno-science' or 'folk psychology' that all people carry around in their heads. Common sense is largely a culture specific phenomena, and it is rooted in the context of culture which constrains our lives--'it determines the kinds of observations, the rules for assembling those observations into sense, and even what constitutes sense. As a sense making system, common sense is functionally equivalent to theory in the sciences.' (Dunnell:12)

Common sense is bound ethnocentrically by the same culture historical horizons of which it is composed. It is synonymous with the paradigmatic world view of culture history in that its intensive 'sense' is largely determined by the existing status quo of power relations in a society--who controls change is the arbiter of 'sense' in even an experiential mode, and change that happens as a consequence of power is seen to 'make sense' much as 'might makes right'. In this 'embedded' sense, common sense is reflective of but not reflexive upon, the power relations, class differences and inequalities of social structure in which it is rooted and derived. Socio linguistically and psycho dynamically, it is 'situated' in local, dyadic discursive practices--speech styles, code switching, jargons and pragmatics which reinforce or reflect these social differences.

The 'general structure' of common sense is conditioned by the mechanism of its 'natural selection'. No common sense could persist if it routinely led to incorrect solutions that affect the

transmission and reproduction of a cultural grouping. Common sense is practical and works within its own culture historical provenience. No common sense can persist in the face of competition with a more powerful common sense. As a product of selection, common sense is adapted to the framework experienced by living people; it is the height of presentism. Common sense changes, largely unmarked, to meet changed conditions.

"…it does not itself embody a developed notion of time; in fact, even the notion of qualitatively different time is a relatively modern notion in western cultures and is in large part linked to the development of science (Toulmin and Goodfield, 1965). It is easy enough to appreciate why common sense is incapable of embodying a serial notion of time, beyond a rather nebulous sense of history. Selection places no premium on longevity--longevity thwarts change. in that future conditions are unknown, they cannot be anticipated by common sense. To incorporate a past would be anachronistic and maladaptive. A common sense that 'averaged' large amounts of time would because of change, be a poor adaptation at any given time. Thus, common sense is space like and essentialists." (Dunnell, 1972: 12-13)

Common sense exerts its influence largely on an unconscious level--it consists of those pre-understandings of our culture history, embodied in the knowledge of our experience which predetermine and condition our consciousness in subtle and 'unmarked' ways. Its pervasive and persuasive influence in our lives is due to the fact that it goes mostly unnoticed and unrecognized for what it is, as something given, to be taken for granted and to be left unquestioned. The difference between common sense and science is that the former is mostly implicit and must remain so, while the latter depends upon bringing the implicitness of knowledge into explicit, reflexive recognition. Like mythology, of which common sense is but a secularized everyday version, common sense normally embodies contradictions and partiality of understanding. All that is important is that this contradictoriness and partiality of common sense remains unconscious in its functioning. 'We cannot

know it explicitly, cannot examine its premises, and are unable to control its change…The need for science derives from posing questions that are not permissible within common sense, and thereby not answerable within it. For these new questions, a substitute system must be manufactured explicitly if the system is to be manufactured at all.' (Dunnell: 13)

Thus common sense as a culture historical phenomena competes with science for possession of mind, and the history of the rise of science can be seen as well as a dialectic between common sense and science. Unlike science, common sense is virtually invisible since we are not usually aware of its functioning in our lives. 'Once data are converted into a form that is tractile in common sense (by the extraction of its temporality) explanation is virtually self evident and almost unchallengable.' (Dunnell: 13)

"Realizing that common sense competes with scientific explanation where the two overlap in subject matter and that science must initially be forged out of common sense may explain many of the gross features of the history and development of modern science. It is probably not accidental that the first sciences to develop, and those which have enjoyed the greatest success are those in which an essentialist framework is workable, and the subject matter at a very different scale that that attended to by common sense. The former feature requires the least amount of change, while the latter insures modest competition. Sciences that attend to phenomena at similar scales and require a materialist framework are the least well developed, the last to appear and have been won at the price of accepting a man/nature dichotomy." (Toulmin and Goodfield, 1965)

"The history of science is really one of the development of theory as a substitute for common sense and a constant battle against the incursions of common sense. When explicit theory fails or is incomplete, the space is not left vacant--common sense will fill it…" (Dunnell, 1972:14)

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Common sense as an implicit horizon of human experience, is in dialectical competition with science as an explicit horizon of human experience--both compete with one another to achieve a 'consensus' of understanding and 'order' of reality. Common sense does so in terms of world view and its paradigmatics, science does so in terms of mindness and its realization. To the extent that science, as normal, rationalizing world view, is paradigmatic, it can be said to be embedded within and dependent upon the metaphorical power of common sense--to the extent that science explicitly becomes meta-paradigmatic it can be said to transcend and synthetically replace common sense as the primary sense making device of modern consciousness. Common sense and science exist in a mutual relationship--today our common sense of the world is as much informed by our views of science as our sciences in the past have been unconsciously informed by our common sense view of the world. Common sense is perhaps an inevitable outcome of science, and science is perhaps an inevitable outcome of common sense. Ultimately science must appeal to the same empirical source of what is most common about our senses as our common sense is rooted in our everyday experience of reality--both seek a 'consensus' of vision about the world, although the explicit criteria of the former are more constrained and constraining than the implicit criteria of the latter. Common sense can be said to be the 'intuitive' ground--the fertile soil of human consciousness, from which we configure and reconfigure our scientific understanding. It is the intuitive and counter intuitive creativity of our common sense that we regularly construct, deconstruct and reconstruct our scientific systems. The danger and the strength of science can be found in its appeal to and contradiction of common sense--it is when our scientific sense contradicts our common sense, or our common sense seems counter intuitive to our scientific sense, that we recognize the existence of conflict and the need for change in our ways of experiencing reality.

As a system of symbolic generalization, science shares with common sense the symbolic function of human language to express, reflect and understand our experience of human reality. Understanding the linguistic praxis common to both science and to common sense as modes of expression and experiencing reality is important to understanding the limits of both.

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Change is the most difficult problem which science must deal with. An historical 'evolutionary' time like science attempting to understanding the 'structure' of change is perhaps the most general kind of scientific explanation yet available to humankind.

A key theoretical issue is whether or not an evolutionary frame of mind is a necessary and sufficient form of explanation for the understanding of the interrelationships of natural phenomena, and of changes, through time. If not, then what might be? This issue constitutes one of the principle horizons of our scientific knowledge.

Evolutionary theory is not the actual origin itself, but constitutes a way of modeling our minds about change. Evolution moves toward an 'ecological' frame of mind 'as a new way of thinking about ideas and aggregates of ideas called mind.' (Bateson, 1972) Roy Rappaport associates ecological order with the term logos--the 'rational relation of things to one another', 'the general sense of order or measure'. Ecological mind is in this sense of order 'holistic'. Logos, in somes, in the thought of Heraclitus and his followers designated the principle through which the cosmos is generated, ordered, united and maintained, or even the ordered, united, evolving cosmos itself.' (Bateson, 1984:309) 'The logos is, therefore, the common principle making possible understanding between man and the world and also between men.' (Kleinkrecht, 1967: 81; in Rappaport, 1984:310)

An ecological frame of mind about evolutionary theory leads to a metalogical dialogue about this problematic topic such that 'the structure of the conversation as a whole is also relevant to the same subject'. Meta-logic is beyond the scope of the structure of our logic, a metaphysics of that logic, which defines our ecological frame of mind, structured as it is by the apperceptive awareness of our own evolution. The meta-logic of our dialectical comprehension of the logos of nature is itself a reflection of the logos of nature is itself a reflection of that logos, and our 'coming to terms' with it we call 'science'. We are, as far as we know, the only creatures to have evolved a capacity for reflexively comprehending both the logos of nature and of our own being.

In speaking of sense of order, or 'structure' or 'system' whether formal, functional, deep, generative, architectonic, etc. do we really mean something different from 'sense' itself, or sense/nonsense or 'meaning/ameaning', whether symbolic, psychological, affective, behavioral, idiomatic or as Gregory Bateson put it, are we merely 'tying knots in our handkerchief' such that 'these terms will forever stand, not as fences hiding the unknown free from future investigators, but rather as signposts which read: 'UNEXPLORED BEYOND THIS POINT'. Language spoken or textual, can obfuscate as well as clarify. 'Structure' and 'system' may only be convenient substitutes hiding or own ignorance.

Our science is systemic as 'natural system's theory'--meaning general approximation or modeling of physical, biological and human patterning of natural phenomena. Nature is universal--there can be no going beyond it. But our science is finite and limited. We can go beyond it.

Irreversible change is the logos of nature, its only unchanging absolute is the fact of change itself. In reference to universal change, I refer to the 'natural continuum'. Change, defined as alteration, modification, mutation, transformation, metamorphosis, variation, differentiation, revolution, implies disorganization, decay, disorder, chaos, entropy. When constrained by some kind of 'redundancy' (i.e. cybernetic information) change is no longer fortuitous chance, randomness, or chaos, but becomes patterned,

systemic, ordered, predictable, recursive, restrained, relevant and meaningful. As natural systems theory, our science implies a quest for informational systems of the patterning of natural phenomena in relationship to the principle of universal change.

"Any aggregate of events or objects (e.g. A sequence of phonemes, a painting, or a frog or a culture) shall be said to contain 'redundancy' or 'pattern', if the aggregate can be divided in any way by a 'slash mark', such that an observer perceiving only what in on one side of the slash mark can guess with better than random success, what is on the other side of the slash mark. We may say that what is on one side of the slash contains information or has meaning about what is on the other side…" (Gregory Bateson, 1972: 130-2)

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The logos of science is natural change, or entropy. Science can be described as 'natural systems theory' which attempts to adduce and explain how patterns of natural phenomena maintain a sense of order in the flow of change, or how dynamic structures endure through the process of change over the long term.

The logos of science as natural systems theory seeks explanation as to why things and relations between things change in the world.

Natural systems are self organizing systems whose patternings and transformations are in part determined by the relational functions between its elements and the possibilities of patterning which these functions can account for. Self organizing systems theory, seeks to understand the functional transform 'rules' of relation which guides the patterning. It also seeks to understand the total history of the process of patterning such that the understanding of individual events can be understood as a function of the overall stability of the system through time.

In natural systems theory there are recognizable three 'informational' horizons of scientific understanding. The most basic and comprehensive is the physical level. A subsystem of the first is the biological level and a subsystem of the biological level is the human level. At each of these levels, there are different orders of phenomena and the experience of these phenomena. Each subsequent subsystem comprises a different order of organizational complexity of information. The higher the level, the more general and 'time like' the understanding and the less precise and predictable the patterning. At each ascending level there are synergistic patternings of the 'system' which cannot be accounted for by the analysis of its lower order parts. Understanding of the information of the subsequent order or complexity cannot be sufficiently reduced to the terms of the previous, lower orders, though understanding of the previous orders is prerequisite to the complete understanding of higher levels.

"…In such a hierarchy of determinations, physical and chemical laws stand as absolutely necessary for the explanation of biological phenomena, but they are equally and absolutely insufficient.

The same kind of hierarchical relationships holds for culture vis-à-vis biology (and by implication physics and chemistry). Culture is biology plus the symbolic faculty…" (M. Sahlins, 1976:65-6)

Part of the program of science has nevertheless been the reduction of higher order patterning to explication in terms of lower order elements and their interrelations. This approach to science has been analytical in orientation and reductionistic in aim. This is not an appropriate role for scientific research--it is a necessary prelude to the kind of synthetic understanding which should eventually follow. But description of how patterns is not an adequate answer for why questions.

We cannot translate all biological processes into purely physical terms, nor all cultural or human processes into purely biological or physical terms--such a process of continuous and complete

reductionism entails the complete extraction of the time like dimensionality of the higher order levels of generalization.

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Science as reflexive of mind, as 'natural systems theory' is based upon the function of a 'relational logic' which follows certain 'relational rules' which govern transformation and change. the relational logic which informs such 'natural science' in its dialectic of mindness is fundamentally different from the mathematical and rational logic held to inform scientific discourse. This 'relational logic' is both metalogical and meta-paradigmatic in being both beyond logic and paradigms in the formal sense and about such logic and paradigms, and it provides the alternative criteria of substantiation, operation and validation within the 'third culture' of culture history which is irreducibly different from the criteria applicable within the arts or the sciences--its philosophy of inquiry is fundamentally different from either a philosophy of science or a philosophy of the arts.

Science has not been so much based upon the 'discovery' of preexisting principles as much as on the invention and creation of a posteriori rules of relationship accounting for previously observed patterns of phenomena. The 'structures' of scientific theory are held to be partially and imperfectly representative or isomorphic with the eidetic, apodictic 'structures' underlying and governing the observable patterning of phenomena in the real experiential world. Logos is both the ordering principle of the cosmos and of human mind--the principle of logos holds that human rationality is capable of comprehending the logos of the universe. It is no accident that logos has come to mean knowledge as expressed by language. The critique of 'pure' science has been that this logos of language is embedded within and embodies the hermeneutic circles of the culture history of mind. There can be no pure perceptual experience of real phenomena nor an 'unbiased; account of such experience, which has not been un-preconditioned by the phenomenological 'intentionality structures' which we bring to the

ordering of our experience. It follows that the basic difference between the rational 'two value logic' of the 'hard sciences' and the relational logic informing the 'third culture' is that culture history as a 'science' of humankind, must somehow take into account in its formulations of theory and praxis the influence and phenomenological substrate of the experiencing mind, as something more than mere super structural epiphenomena or a residue of physical process. Any other account of human reality must necessarily and insufficiently be 'reductionistic' and 'reifying'. The logos and language of relational understanding cannot be positivistically reducible to a perfect one to one correspondence between the term and the thing. Such mechanical/material theories of language have a much deeper history of ideas than most modern social scientists or linguists would care to elucidate. Relational logos must somehow account for the connotational indeterminacy of its significations.

Rational systems are typically 'over determined' systems, especially when they are premised upon relationships which are based on unidirectional causality. Systems of functional relations are over determined 'structures' of direct causality based upon the minimization of uncertainty or the maximization of 'information'. Such systems are physically 'perfect' in a mechanical sense of being unaffected by the law of entropy.

Relational systems are 'natural' systems rather than purely abstract or mathematical or noumenal structures--natural systems are entropic and 'weakly' chaotic in that they tend to grow predictably from certain order toward uncertain chaos. Such system manifest 'self organizing criticality' which accounts for a wide range of variation of phenomenal patterning based on the total history of the functioning of a few basic rules of relation. The elaborated patternings of phenomenal 'structures' are but the long term derivative of fairly fixed and stable, 'robust' patternings based upon the crystallization of these basic sets of rules functioning at different scales, orders and magnitude of interaction and relation---they are 'weakly determined' by the transformation of basic relational rules governing the eidetic structure of the systems minimal components.

Relational logic attempts to understand and reduce in a systematic way complex phenomena to such a basic set of relational rules among a minimal set of component entities, within a total universal context of possible relations. Such relational logic is also inductive and empirical in the sense of being derived from phenomenological perceptual experience rather than being based upon conceptions of innate, a priori rational structures or sense of perfect order. Relational logic is the logos of natural systems theory, concerned not so much with 'truth', identity or validity in any absolute sense but with accounting for the concurrence, sequence and recurrence of patterns of change in phenomenological experience. It seeks identity and difference in a 'relative' sense of relational contextuality.

The purpose of relational logic is the understanding of how complex systems or patterns of phenomena come to be self organizing or self regulating, and how such systems naturally tend to evolve towards chaotic states of super criticality. The long terms structures and dynamics of complex systems are the consequences of the total history of transformations and interrelations based upon the operation of basic relational 'forces' between individual component entities of the system, in relation to environmental transformations affecting it. Complex structures must be construed as so many possible permutations of a basic set of relational rules which are interacting within complex environments. There exist no isomorphic, eidetic 'structures' which dictate causal necessity to the developmental history of such patternings--they are randomly organized. The complex patterns are epiphenomenal events resulting from the interplay of a variety of interrelated phenomena.

Like galaxies, solar systems, land masses, clouds, human systems of culture, symbols, economics, ecology and history are self organizing and weakly chaotic. Physics, astronomy, geology, chemistry and biology are all founded theoretically upon basic relational paradigms--the formal sense of a set of rules governing the relations between entities--sets of basic relational rules forming limiting constraints upon the behavior of component entities of a system. Intermediate relational rules describe the interactive transformations of relations within the environment. Epiphenomenal relational patternings are those observable

'structures' which constitute the phenomenological order of the real world.

Natural systems theory attempts to describe the basic relational rules, account for the intermediate, derivative transformational rules, and the epiphenomenal patterning at several distinctive orders of phenomenological experience--the physical, biological and the human. These levels is constrained by lower order rules and yet involves more complex sets of intermediate relations which confer upon such systems greater dynamic variability, indeterminacy and chaos. Higher order systems must remain non-contradictory with respect to lower order rules, but the patterning of their relations are also synergistic and irreducible to lower order rules.

It is possible to explicate and 'discover' a basic relational meta-paradigm governing pan human behavior, social structure, cognition and culture historical process, but this has not yet been achieved. Incomplete and partial relational sets have been devised governing certain facets of human experience--Marxian theory of 'modes of production' and 'relations of production' are an example. But the problem of integrating the complexities of human reality have not yet been resolved in a scientifically satisfactory manner.

Relational logic is also 'dialogical' and dialectical in the sense that its functions through question and answer, respondent and opponent dialectic which explores and exhausts the possibilities of the relational 'paradigm'. Such dialectic is neither the strict, precise logic conventionally valued by pure scientists, nor is it just the arbitrary rhetoric espoused by humanists--it yields relatively approximate rules in terms of reasonably convincing and definite statements which are general and stable in accounting for a broad range of phenomena, and which are amenable to further application and suggestive of other alternative possibilities.

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Relational logic is not rational logic.

There exists no a priori or transcendent structure or Cartesian logos to relational rule sets. Rather the basis of the relational organization is based upon the functional integration of the physical properties and characteristics of the minimal component entities, and there overall total relational matrix in the universe.

Relational logic is not concerned so much with validity or truth value as much as with co-occurrence, sequence, and the recurrence of change. It is the logic of dynamic change--difference and identity are understood in a relative and contextual sense rather than in any absolute sense. Relational logic is concerned with the relatively and contextuality of truth or of indirect forms of truth rather than 'truth' itself.

Relational logic does not seek causality or consequentiality but correlational significance of associations.

The number of possible relations and patterns is determined by the number of 'independent variables' of the basic system.

There are three levels of relational rules:

1. Basic relational rule.

2. Relational combinations, intermediate derivative rules.

3. Observed patternings of phenomena.

Higher order systems are non-contradictory with lower order systems but are synthetic and involve more rule sets.

Basic relational rules are context independent, static, stable and are articulated at different levels and are variable according to environmental contexts of their articulation. Intermediate derivational rules are context dependent, dynamic and are the conditions of the environment in moderation of the transformation of the basic relational rules.

Higher order systems are derived from more levels of intermediate, permutational relations.

Relational structures represent frozen or fixed patterns which are relatively stable. Relational patterns represent epi-phenomenal variations of a common theme of possibility--alternative profiles of a common horizon.

Relational logic follows set theory as illustrated by Venn diagrams.

Relational rules involve variability, proximity, remoteness, direction/indirection, similarity/difference, affinity, homology and analogy.

Relational rules are basic statements which govern possible combinations. They are entered into an informational system yield sets of results in terms of ordered patternings which resemble crystallitic structures.

There are a bias set of component relations--limited and independent factors.

Basic relational rules are systematic, relatively consistent, stable and general.

Dialectic is the process of elaborating, explicating and refining statements regarding relational rules.

Relational rules inform the basis of 'possibility theory'.

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everything is related to everything else in more than one way, however indirectly.

Relationships are never direct, but always indirect--intermediated by something else.

Some relationships are more indirect than others.

Indirect relationships tend to be hidden from experience.

Nothing exists independently and separately from everything else.

There are no absolute boundaries separating things.

Some things are more directly related than other things.

Meaning is always situated in a web or nexus of relationships between 'things'.

Nothing can be construed outside of its contexts of relatedness with everything else. No group of things can be construed as separate from its web of relationships with everything else.

The ideal relational context is infinite and unending--it can never be encompassed or eliminated.

No matter how satisfying or sufficient, there is always a more interesting connection between things remaining to be discovered.

Everything is changing. Everything changes at different rates.

Relationships between things are always dynamic though slower changing things are more static.

The universe of experience is continually transformative.

The universe of experience is infinite and unending.

The universe of experience can never be encompassed or gotten outside of--we can never know the forest for the trees or see the whole elephant.

There can be no complete knowledge of the whole.

Our knowledge is always bound, limited and direct.

We cannot directly ascertain the inherent indirection between things, but only circumstantially infer such relationship.

The universe of experience is a field of unfinished possibility.

Whatever we know, is always encompassed by all that we do not know.

Some relationships are more basic and long lasting than others.

More basic relationship are more pervasive--but this can only be known in a local and relative way.

Nothing is absolute, nothing is unknowable, nothing is impossible.

Relationships between things are always mediated indirectly by a third 'thing' which becomes expressed through time as a 'force, power, movement, a differential, a state or condition of relation'.

All things are different. No two things are exactly alike.

The universe of experience is characterized by impermanence. Nothing exists forever.

'Things' are fundamentally nonexistent--only relationships between things exist.

The existence of things and their relations is only temporary, ephemeral and transitive.

Things and relations dissolve into other things and relations.

We can only know a thing's shadow, its negative outline and its felt presence of the space it displaces. We can only see what lies just beyond our vision upon our horizon and as soon as we enter a new region, what was there escapes from our sense of presence and we mistake it for what is left behind--its imprint and impression, its sense of absence. We seek to discover what it is, only to find out what it is not, but in the process we crowd it out of our present space. We force it into the ever beyond. We bound it in a negative way, internally. It is no longer infinite, no longer total and in its absence can never become complete.

And so science is lead by its own tail of ignorance.

ENTROPY, EFFICIENCY AND EVOLUTION OF MIND

George H. Spencer's synthetic theory of universal evolution explained that everything evolves from simple to complex. This occurs inspite of entropy, which states that everything rends toward a random disorder--absolute simplicity. The dictum of parsimony implies an intrinsic 'eco-logism' of natural systems and logos--that natural systems always inherently tend to efficiency maximization--a built in 'presence' or 'mind' or rationality of systems. Minimization of randomness or noise if not necessarily synonymous with the maximization of efficiency but the two meanings are often conflated.

Human cultural evolution is said to have developed on the basis of increasing efficiency in energy use. Progress has been based upon the principle of efficiency maximization--science validates itself on the basis of 'efficiency rules'.

A critical difference must be recognized between a narrow sense of efficiency--1920 gasoline engines were less fuel efficient than 1992 gasoline engines--and a sense of total systemic efficiency within a larger global or universal ecosystem--modern post industrial fossil fuel economies are less energy efficient, but more energy consumptive than 17th century north American hunting and gathering subsistence economies. It must be asked if in the long teleological train of human evolutionary events, whether stones to make stone tools were necessarily any less efficient that tools to make tools to make tools to make internal combustion engines.

Judgments about absolute efficiency of systems depends upon the completeness and closure of such systems as functionally autonomous entities--but in the universe of determinations, one in which our solar system is but one very diminished spot and in which we haven’t yet found any sense of a boundary, there is a different sense of relative efficiency of all systems which are in

fact subsystems composed of subsystems within greater subsystems--in such a universal framework it no longer makes much sense to speak about 'efficiency' in any but the most limited way.

The ideal of absolute efficiency is another implication of the rational ideal of perfect mind existing in perfect space and perfect time. Rationality itself strives for such perfect efficiency--flawless decision making, logic, definition, etc. Increasing efficiency is spoken of as an ideal--a value judgment we make in relation to people and things. Movement toward greater efficiency, 'economy of effort' underlies the principle of progress. Yet the only truly efficient development seems to have been the evolution of mind--producing something from nothing and more from less--an 'anti entropy' which defies simplistic explanation.

PARSIMONY, PURITY AND POLLUTION

The principle of parsimony or sparingness or extreme frugality or economy underlies rational idealism and has come down in scientific rationalism as 'Ockham's Razor'--to always choose the simplest of competing explanations, theories as the most reasonable and least problematic. It is a principle implying that the rational world of perfect mind is a perfectly coherent order which is inherently simplifying and easier rather than more difficult to understand. Simple models are preferable over complex elaborate ones. This leads to a principle in language usage and writing style that the simplicity is the essence of sound communication and style, reducing the effects or random noise or possible error. Symbolic logic reflects this principle, and it underlies the use of statistics as a descriptive language. The principle of parsimony is frequently applied to justify scientific theories whether or not the real, natural order or record is simple or complex. Implicit in this kind of reason is that in the logic of determinations, the one is better than the many, the singular preferable to the variable. This reflects values of perfection and absoluteness.

The indiscriminant application of the principle of parsimony begs the question of whether nature or logos are always or necessarily organized on the principles of efficiency, simplicity and maximum coherence or noise reduction. It also begs the question of whether the simplest argument or explanation is necessarily the best or most accurate one possible. But its adherence, if in name only, does reveal an implicit value orientation of rationalists--perfect mind is pure, and falsity is pollution which must be ritualistically and mythologically tabooed. Parsimony is one way of tabooing unparsimonious cognitive or conceptual pollution. Pure mind must be protected by Ockham's Razor. Falseness itself is not tabooed--it is only negatively sanctioned as a kind of indirect constraint upon the perfect mind. The real dangerous pollution is the indeterminacy, the noise, the bias, the unknown and the affects of randomization. Uncertainty is tabooed as intolerable in the rational mind.

It is interesting to speculate that purity and pollution in the ordering of the rational mind might not entail certain fundamental contradictions in the rationalistic world view. Our progress towards perfection means the development of pure science, pure mind, pure reason. We bring brand new perfection through the front door, the ritually pure and sanctified and we through the pollution out the back door as garbage. As our rational science creates a perfect paradise on earth, it has been noticed by more than a few scientists, pure and applied, that the levels of technological pollution of increasing beyond our limits of tolerance.

VERUS AND FALSUS

That logo-centrism leads to the reification of rational ideas as if they preexisted a priori to their instantiation experience and a misplaced concreteness of the abstract form of ideas as expressed textually in words, and therefore to a prefabricated construction of a rationally ordered reality through its textualization--I speak and write with words, therefore they must be real and true themselves

and not just representative of reality and truth--also leads to the conclusion that scientific rationalism is also a conceptual construction of mind. Our scientific mind is also constructed on the basis of implicit preconceptions about order, rationality, progress and perfection.

Rational idealism entails an implicit preconception of truth as 'veritas' or 'verus'--that something is genuine, authentic, actual or agreeable to fact--a statement is either true or it is not true, or false. The truth of something can be reasonable predetermined in terms of having 'all the distinctive qualities of the thing specified'. Falseness comes from the Latin fallere--to deceive--and implies something that is untrue, contrary to fact or truth, incorrect, wrong, mistaken. It also implies deceit, lying or dishonesty. The possibility of falsehood is concomitant with the possibility of truth.

Rational idealism preconceives of perfect truth (and truth as a state of being perfect) Mathematical equations such as one plus one equals two is the best example of this a priori, perfect kind of truth. In this regard any error is false, an imperfect state--one and one cannot equal one and a half, nor any other number besides two. In its absoluteness, perfect truth is always singular and invariable--falseness is defined in relation to truth. Scientific rationalism approximates perfect truth and falseness as the ideal state of perfect mind--the approximateness of the empirical, inductive character of science is seen as a necessary impurity, a sobering indeterminacy or uncertainty of the possibility of falseness. But progress in science is the reduction of falseness.

Rational idealism and scientific rationalism can admit only of truth and falseness--anything that is not true is automatically false. In logic this is express as truth value, the law of identity or non-contradiction and the principle of the excluded middle ground--there can be no half truths or part falsehoods in a perfectly rational world. This is referred to as two value or dichotomous logic. In statistics, this is expressed in terms of the null hypothesis--arbitrarily determined limits of tolerance for random error. In the statistical world anything that is not random is either biased (false) or true (valid). In other words, there can be no in-between ground or part true and part false--no imperfect truth or uncertain logic.

RATIONAL IDEALISM AND PERFECT MIND

The enlightenment quest for mental perfection is the psychological embodiment of the doctrine of rational idealism. The scientific quest for the perfect logos or mind is also an expression of the doctrine of rational idealism. Perfect mind, according to this doctrine, is the textual realization of final, absolute, flawless, eternal truth. It leads to the ideology of the progress of scientific theory to the discovery of the universal logos in terms of 'natural systems theory'. Perfect mind is an ideal conceptual space occupied by monothetic, nomothetic ideal forms--preferable expressed numerically and mathematically. Perfect mind is the mathematical mind (the mind of exact and accurate 'learning').

Rational idealism began with Socrates and idea of ideal platonic forms, and has subsequently become the predominant theme in western philosophy. It is based upon the belief in the a priori preexistence of prefect, ideal forms, such as the ideal table or ideal horse, of which every instance is but an imperfect replica--a doctrine easily uprooted when it comes to tables, chairs and horses, but one which has proven fairly intransigent when it comes to mathematical notions about truth, beauty, goodness, right and reason itself. Rationalism has become the philosophical doctrine that accepts reason as the only authority in the determination of opinion or decision, that reason or intellect is the true source of knowledge, rather than the senses and that rejects divine revelation of the supernatural--reason is the sole source of knowledge.

Reason becomes the expression and manifestation of perfect mind--it is also the justification and normative function of the principle of presence. Reasoning entails planning, speculating, calculating, weighing options, logical ratiocination and decision making--ratiocination is the act of formal reasoning using especially mathematical logic--using special symbols manipulated according to exact principles. Ratiocination is the act of determining rations or proportions of difference of balancing or weighing the difference.

The rational ideal is to reduce all concepts to single word determinations of truth and falsity--single words with exact, absolute, changeless single meanings relatable to other word concepts in a nomothetic table of classification by precise determination or measurement of the 'ration' of difference. Rational idealism implies first a universal framework of meaning organized by universal principles of difference and order, secondly a pre-determinable exactness or perfect precision of reason against which all instances are judged and finally a normative decision making process in the realization of perfect mind.

PERFECTION, PARADISE AND THE PRINCIPLE OF PRESENCE

Progress implies advancement toward a state of perfection, or perfectionment which is an ideal of perfectionism--the doctrine that moral, religious and social perfection can and should be attained on earth. Progress implies the process of perfecting. The perfectionist ideal is a heavenly paradise on earth--a place of perfect place, and an age of perfect time. Construction of the city on the hill is the collective achievement of this realization. Millenarian dreams and movements, so basic to the Judeo-Christian tradition elaborate the perfectionist doctrine of the coming of a perfect time, or the creation of a perfect place. Enlightenment doctrine secularized this millenarian philosophy within the logocentricity of scientific rationalism--'in the modern world the intelligence of public opinion is the one indispensable condition of social progress'. (President Elliot of Harvard) Reform through modern education and education as a social institution founded upon the principle of enlightenment have become the hallmarks of becoming modern.

Central to these doctrines is the implicit value orientations of perfectionism--of perfect mind and body, perfect state of being, perfect self and perfect society free of defect, error, weakness. This normative preconception stands behind and before our scientific rationalism as implicit ideal standards of comparison in our

estimations of reality, always indirectly prescriptive in dictating notions of rational and scientific purity. Science never addresses directly this normative idealism, as it never deals directly with its own logocentricity, as such attempts would undermine the anti-religious ideology of scientific rationalism. It is no accident that the primarily normative criteria of psychiatric health is 'adaptive functioning' defined in terms of economic success, social status and past time activities. Perfection is also embodied in the periodic table of the elements, Newton's Law of Gravity and Einstein's 'E=Mcsquared'. Physiological health is a perfect state free of disease and disorder and a perfect efficiency of a machine must defy the laws of thermodynamics.

The doctrines of progress and perfectionism to the extent that they are validations of the present in retrojection to a past and projection toward a future, imply the principle of presence--the presence of a mysterious spirituality manifest in the present or realized in terms of the past or future. The principle of presence privileges the immediate understanding as somehow significantly related to the understanding of the past and the future, that present progress will lead to future perfection, and comes from past regression.

LOGOCENTRISM AND THE PRINCIPLE OF PROGRESS

Progress has become the orienting and organizing principle of our modern scientific world view. It is the principle upon which our modern world has been construed, infusing with significance every aspect of our collective existence. The imperative of development (undevelopment, underdevelopment, developing, overdeveloped and cycles of redevelopment) has become the global force in the determination of political economic success and survival. It entails an ethos of 'achievement at any cost' which has become translated into a psychological construct of 'achievement motivation' as the personal internalization of the principle of progress--the driving

willpower to succeed in political economic terms. Progress informs our personal and daily lives with fundamental significance--the need to improve, to make it, to get ahead, to succeed, and it informs our understanding of mind as intelligence, enlightenment, discovery. This predominance has occurred inspite of the inherent 'blindness' of the principle of progress in the estimation of future prospects. Pre-science and predictability, long the goals of scientific rationality are absolute impossibilities in the sense of 'seeing into the future'. Consequently progress is always measured in hindsight, in comparison of present states with states associated with the past. The past then becomes endowed with progressive purposes in service of the present--a kind of self fulfilling teleology and ontogeny.

Progress, as a dominant principle, is not as ancient as the idea of logos. The Greeks did not embrace the notion of progress (from the Latin pro- before and gradi- to step, go) but it arose in conjunction with the Romanization and later Christianization of the western world. It became a Christian doctrine of advancement toward a perfect place and time--the ideal of the city on the hill. Members of the enlightenment embraced and elaborated the principle of progress, which later became an essential part of the scientific revolution against the Christian theological straight jacket. The rational mind of a secular science found liberation from religious doctrine. Progress became central to the new doctrine of scientific enlightenment.

The enlightenment and the scientific revolution of mind shrugged off the yoke of narrow doctrinarianism but did not transcend the inherent logocentrism of the tradition it so radically revised--the word boundedness of mind which treated the written word as the embodiment of truth, or of the rational ideal from which has led to so much reification (turning a being into a thing) and to so much 'misplaced concreteness' (treating ideas as if materially real). This logocentrism has led our modern scientific rational mind in quest of the impossible--the realization of perfection.

THANATOLOGICAL SCIENCE AND SCIENTIFIC THANATOPHOBIA

The view that represents a scientific rationalism as a cultural institution preoccupied with perfection, progress, purity, parsimony, anti-entropic efficiency, presence might also lead to conjecture about the psychological sources of this preoccupation. Tabooing of randomness and uncertainty as pollution and the search for perfect order which is timeless and transcends change leads to the speculation that symbolically and ideologically science may be attempting to ultimately control or exorcise death as the inevitable entropic epi-phenomena of life and to root out 'decay' as this is dialectically anti-thetical to the fundamental organizing principles science upholds.

From a strictly scientific point of view, death represents not only the great 'unknown' but even more important the great 'unknowable'--the kind of rational, experiential consciousness upon which science is founded cannot freely pass into and out of the dark state of death--as scientific mythology, Frankenstein became the abominable apparition of a scientific anti-structure which embraces the knowledge of death.

Science has been held to have evolved out of magic--magic and science share many interesting affinities--emphasis on causality, decision making based upon randomization of possible choices, emphasis on explanation, prediction and control of unseen events, the teleological praxis of making something happen, procedural manipulation of 'things' to produce 'results'. Though it is obvious that there are important contrasts between science and magic, it remains important not to completely dismiss the analogy between science and magic as irrelevant. Much of the magic has been involved with witchcraft and dealings with death and disease--magic has formed a kind of projective system which allows its practitioners to symbolically externalize and displace onto others problems which is situated in themselves. It remains to be asked whether science also doesn’t constitute a similar kind of projective system.

Scientific progress has been held to account for the exorcism of death upon the planet earth--diseases of all kinds have been eliminated or effectively controlled, famine has become banished

from developed nations, even natural disaster's are being brought under control. And yet scientific progress has also lead to the creation and proliferation of weapons of mass destruction and potential extermination. Scientific knowledge is greatly analytical, aimed at cognitive control by the reduction of uncertainty. Lab dissection has been the metaphor of scientific haruspication. Ritual purity and pollution bespeak an obsessive compulsive fear and fascination with death--one that is historically well founded in the human struggle for natural survival.

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