Narrative Pluralism

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A. Introduction

Einstein's revolution led philosophers and historians of science to abandon 19th-century views of scientific progress as a smooth accumulation of tested facts. Scholars came to focus instead on the processes by which one theory displaces or subsumes another. By the 1960s, obsession with competing theories became so extreme that increasingly all science was defined and interpreted relative to its infrequent revolutions. [Kuhn 1962] This narrative Gestalt has spread through contemporary culture, dominating its perceptions of the advancement of knowledge.

Generally the natural sciences ignore outsider analysis, but the narrative fixation on the dialectical side of scientific development has had and continues to have a deleterious effect on the human sciences. Of course, theory displacement offers a true characterisation of important chapters in science history. But there are many major advances in science for which the narrative of scientific revolutions, including its intervals of "normal science", has no explanatory power. More to the point, in the human sciences those "extraordinary episodes" which have "necessitated the community's rejection of one time-honored scientific theory in favor of another incompatible with it," are virtually unknown. [Kuhn 1962, p. 6] In economics, for example, the absence of such episodes weighs so heavily on its pursuit of understanding that no sensible overview of its fundamental ideas is possible without abandoning the traditional narrative structure.

The notion of *narrative* provides this essay with its central organizing concept. The term is deployed inclusively, so as to encompass everything from the theories of micro physics to the myths of traditional societies. Narratives commonly taught in universities, “knowledge narratives”, will receive primary attention. It frequently happens that in a field of empirical enquiry there emerge several narratives which rather than being contradictory or incompatible are complementary in the sense of offering different windows for observation of the same or overlapping domains of phenomena. Every narrative – and, therefore, every theory, paradigm and research program – launches itself from a conceptual framework, including a set of

presuppositions about the nature of reality. Inevitably, different conceptual frameworks offer different points of view on the object of inquiry. What one sees when one looks at Michelangelo's statue of David depends on the standpoint from which it is observed; similarly, what any empirical inquiry makes of its object depends on the conceptual framework through which it is viewed. Just as full appreciation of David requires viewing it from more than one perspective, so knowledge accumulation often depends upon investigating empirical domains through more than one narrative. I call this the doctrine of **narrative pluralism**. It is the same view of empirical understanding that the physicist David Bohm describes as follows.

> What is called for is not an *integration* of thought, or a kind of imposed unity, for any such imposed point of view would itself be merely another fragment. Rather, all our different ways of thinking are to be considered as different ways of looking at the one reality, each with some domain in which it is clear and adequate. One may indeed compare a theory to a particular view of some object. Each view gives an appearance of the object in some aspect. The whole object is not perceived in any one view but, rather, it is grasped only *implicitly* as that single reality which is shown in all these views. When we deeply understand that our theories also work in this way, then we will not fall into the habit of seeing reality and acting toward it as if it were constituted of separately existent fragments corresponding to how it appears in our thought and in our imagination when we take our theories to be 'direct descriptions of reality as it is'. [Bohm 1983, pp. 7-8]

The details of these and related arguments will be set out in three sections. First, the narrative function of conceptual frameworks will be explained by examining their various standard elements. Second, 20th-century physics will be surveyed as an exemplary case of narrative pluralism and its benefits. Third, narrative pathologies common to the human sciences and a consequence of anti-pluralism will be identified.

B. Narrative Selection

1. Simplification

"[E]xperience has to organize," wrote Henry James, "some system of observation – for fear, in the immensity, of losing its way." [James 1962, p. 3] At the social level, this path finding embodies itself in various forms of representation: maps, verbal accounts, formulae, systems of equations, graphs, pictures, etc.. All representations, whatever their form, proceed on the basis of a simplification of reality. There are no exceptions to this rule, not even the most sophisticated scientific theories. Jorge Luis Borges's parable "Of Exactitude in Science" illustrates the folly of disregarding this most fundamental of all narrative principles.

> . . . In that Empire, the craft of Cartography attained such Perfection that the Map of a Single province covered the space of an entire City, and the Map of the Empire itself an entire Province. In the course of Time, these Extensive maps were found somehow wanting, and so the College of Cartographers evolved a Map of the Empire that was of the same Scale as the Empire and coincided with it point for point. Less attentive to the Study of Cartography, succeeding Generations came to judge a map of such Magnitude cumbersome, and, not without Irreverence, they abandoned it to the Rigours of sun and Rain. In the western Deserts, tattered Fragments of the Map are still to be found, Sheltering an occasional Beast or beggar; in the whole Nation, no other relic is left of the Discipline of Geography. [Borges 1975, p. 131]

But charming and useful as it is, Borges's parable illustrates only one aspect of any representation's need for simplification. For every empirical domain there exists an infinity of possible points of view and, therefore, also of potential observations. These plethoras of possibilities together with the dilemma posed by Borges present observer/narrators with an acute problem of choice. They must decide which features of their domains they are going to describe and which they are going to disregard. Each of their narratives can proceed only on the basis of a radical simplification of reality. To this end, and in lieu of random observations from random points of view, narrators deploy principles of selection, or what James called "systems of observation" and today's writers usually call "conceptual frameworks". This process abstracts certain features of the narrative's domain while ignoring others. A narrative may make explicit its narrative framework, but more often it leaves it partly or wholly concealed, leaving it to operate outside critical awareness.

We must not forget that knowledge narratives, no less than popular and literary ones, explore reality by simplifying it. They obscure great masses of detail, so as to systematically highlight certain aspects of that reality which a group of individuals have identified as being of special interest to themselves. Different but non-competing narratives of the same domain give prominence to different dimensions of that domain. Each narrative functions as an interpretative system, as a *special* way of perceiving some corner of existence.

Narrative selection proceeds through a set of assumptions which simplify or pre-empt many features of the narrative's domain. These assumptions include a system of classification of entities, the attribution of a limited number of properties to those entities, some metaphysic which posits a kind or kinds of connection between events, and usually the recognition of different structural levels within the domain of inquiry. A narrative also views its domain from a certain scale, omitting details that it sees as too microscopical or too global, too short-run or too long-run. Typically it also describes its domain within some range of accuracy or approximation, ignoring effects which do not fall within that range. Finally, every knowledge narrative has its community of practitioners, people who develop and deploy the narrative in writing and teaching. As socially, economically, geo-politically and historically situated individuals, these people bring to the narrative enterprise various inclinations and sensibilities, as well as overt purposes, all of which help determine which aspects of the domain the narrative includes, emphasizes and ignores.

2. Classification

Wittgenstein noted that "*The limits of my language* mean the limits of my world," and that "what we cannot think we cannot *say* either." [Wittgenstein 1974, 5.6, 5.61] Our categories of thought, including our groupings of the objects of the world, pervade our descriptive use of language and organize all our experience. Even the predicates of everyday language categorize, though not always very precisely, the contents of the world. These informal classifications, with their mixtures of the personal and the cultural, are the means by which we order the perceptual fields of our daily existences. Similarly, every narrative needs to provide some classification of the objects in its domain.

In the specialized narratives of science this shaping of the facts is especially pronounced because the number of categories tends to be strictly limited. The selection of categories inevitably involves arbitrariness because there exists countless numbers of

objectively grounded ways in which the contents of a domain can be categorized. Another parable from Borges illustrates this inescapable aspect of narratives. An Argentinean consults an imaginary Chinese encyclopedia which says that "animals are divided into: (a) belonging to the Emperor, (b) embalmed, (c) tame, (d) sucking pigs), (e) sirens, (f) fabulous, (g) stray dogs, (h) included in the present classification, (i) frenzied, (j) innumerable, (k) drawn with a very fine camel-hair brush, (l) et cetera, (m) having just broken the water pitcher, (n) that from a long way off look like flies." [Foucault, 1971], p. 2]

The outlandishness of Borges's imaginary taxonomy of the animal kingdom, as well as the ambiguity of its selection criteria, suggests the diversity of ways in which one can, without forgoing objective grounding, categorize a sector of reality. Make-believe classifications, however, are not alone in making manifest the arbitrariness of conceptual orders and their resulting perceptual fields. Ethnological studies offer numerous examples of zoological classifications whose non-essential nature is immediately obvious to outsiders. Consider the case of the villagers of Baan Phraan Muan in northeastern Thailand. They divide the animal kingdom on the basis of two criteria: edibility and habitat. [Tamiah 1969] These generate five major primary categories: insects (inedible), birds (edible), water animals (edible), animals of the house and village (animals in the house are inedible, animals under the house are edible) and forest animals (animals of the deep forest are inedible and other forest animals are edible unless they have domesticated counterparts in the house). But these criteria leave numerous organisms known to the Muan standing awkwardly alone in their own primary classes and rivalling Borges's for their apparent fancifulness. These anomalies include house rat (only small children eat), field rat (only small children eat; adults eat privately), giant lizard (medicinal food for children), monitor lizard (edible, but dangerous to mothers after childbirth), chameleon (medicinal food), snake (inedible), vulture (inedible) and crow (inedible).

The Karam people of New Guinea also use habitat as one of the two criteria by which they classify the animal world. [Bulmer 1967] But their notion of habitat differs from that of the villagers of Muan in being two-dimensional. Its horizontal axis has the forest at one pole, the homestead at the other and open country and gardens in between. Its vertical axis runs from aerial through arboreal, terrestrial and aquatic, to subterranean. The Karam's second set of criteria are morphological (physiological): winged or wingless; bony or boneless; bipedal, quadrupedal, multipedal or limbless; elongated or not; and large, medium-sized or small. These two sets of criteria divide the Karam's zoological world into 94 primary categories. One of these, flying birds and bats, contains 44 percent of the Karam's 422 named organisms, whereas another includes only tadpoles.

Cultural bias may incline us to attribute the disparateness between the Muan's and the Karam's ways of dividing up the animal world as due to their common absence of a scientific basis. More especially, we might expect that modern biology with its grounding in evolutionary theory, would provide for animals a determinate and definitive classification. But that is not the case. Science teaches us that the evolutionary process abounds with ambiguities. It is not even clear what are the units that survive or become extinct. Are they genes, fragments of genes, chromosomes, genotypes, phenotypes, groups of organisms, gene pools or species? This assortment of possible basic units has generated various formulations, offering different points of view on the selection process. It is this family of narratives which comprises modern evolutionary biology.

Nor does nature's biological ambiguity as revealed by science end here. Not one but numerous concepts of "species" have emerged from evolutionary theory. [Dupré 1993, pp. 37-

59] These concepts divide into two types, the "biological" and the "phylogenetic". The former defines a species as "a group of organisms connected to one another by actual or possible reproductive links, and reproductively isolated from other organisms." [Dupré, p. 46] Though we may find the biological species concept intuitively satisfying, it is inapplicable to asexual organisms and, therefore, to most micro organisms and, therefore, to microbiology. Phylogenetic taxonomies, on the other hand, have as their basic principle that the organisms forming a species should descend from a common set of "ancestors". But in an evolutionary context this condition obviously is not sufficient. Rules are needed to identify cut-off points in the lines of descent, and to establish "what makes a genealogically coherent set of organisms correspond to the rank of species." [Dupré, p. 48]. To this end, various criteria, each leading to a different classification, have been put forward and used in modern biology.

The plurality of possible basic units of selection and the diverse concepts of "species", however, are neither the only nor the most profound manifestation of pluralism in the classification of organisms in biology today. In ecological biology, niche, not species, is the basic classificatory unit. The idea of niche more resembles the Muan's and the Karam's implicit concept of habitat than it does any of evolutionary biology's notions of species. Frequently more than one species can perform the role required of a particular ecological niche. Consequently, ecological-based classifications of organisms differ greatly from evolutionary-based ones. [Dupré, pp. 43, 58]

Finally, a brief example from Thomas Kuhn will reinforce much that has just been said. It reveals two different classificatory concepts for "molecule" concurrently and productively at work in the physical sciences. Kuhn relates the responses of a "distinguished physicist and an eminent chemist" when asked whether a single atom of helium was or was not a molecule.

> "Both answered without hesitation, but their answers were not the same. For the chemist the atom of helium was a molecule because it behaved like one with respect to the kinetic theory of gases. For the physicist, on the other hand, the helium atom was not a molecule because it displayed no molecular spectrum. Presumably both men were talking of the same particle, but they were viewing it through their own research training and practice. Undoubtedly their experiences had had much in common, but they did not, in this case, tell the two specialists the same thing. [Kuhn 1970, pp. 50-1]

The gist of this and of our other examples of classification can now be summarized. Borges's zoological fantasy, by means of what are from conventional viewpoints its glaring omissions, called our attention to how any classification of an empirical domain limits the possible descriptions, and thereby also the field of possible facts and possible questions. Similarly, without discounting their epistemological value for the cultural-geographical situations to which they are applied, the alien taxonomies the Muan and the Karam encourage us to recognize the indeterminateness and contingency of all classifications of empirical realms. But we also have seen from examples from contemporary biology that even when it comes to dividing up a domain on the basis of the most advanced science there exist more than one plausible and defensible way of doing so. *The best way will depend on the purposes of the narrative for which the classification is intended.* Every categorization of a set of empirical phenomena uniquely circumscribes our possible understanding of that realm of reality, rather as every position which one takes up around Michelangelo's statue of David limits what one can see. Likewise, the numerous ways in which any domain can be divided up means that there exists many different bases for making a systematic inquiry of that domain.

3. Selection of Properties

Of all narrative genres, ontologies are the most elemental because they make assertions about the fundamental nature of reality – about what sorts of entities, properties and relations compose existence. But all narratives, and especially knowledge narratives, postulate a sort of proto-ontology in the sense of identifying a certain range of phenomena (a "universe of discourse") whose existence, real or imagined, they wish to take into account. In the formation of these proto-ontologies, the classification of entities typically requires the predication of various properties, making these two processes inextricably intertwined. This conceptual interdependency is especially pronounced in the more narrowly focused physical sciences, which, from out of the welter of phenomenological possibilities emanating from some empirical domain, abstract a very limited set of phenomena for cognitive attention.

Highly specialized proto-ontologies are commonplace in the study of physical matter. Consider the case of crystallography, the scientific study of crystals. It divides solid bodies into two classes: crystals and non-crystals. This division presumes certain properties – approximately plane geometrical surfaces with straight edges which meet other such planes, thus bounding the object on all sides – which identify some materials as belonging to the crystal category. Along with six kinds of symmetry (mirroring, inversion, and twofold, threefold, fourfold and sixfold rotations) these properties – not mass and extension or chemical composition or market-value – are the fundamental properties of the crystallography narrative. These selected attributes divide the class of all crystals into 32 subclasses. The result is a powerful but quite limited descriptive system, one of many useful frameworks of classes and properties for viewing solid objects.

A classification of objects leads to further questions about what additional characteristics of the entities classified should the narrative recognize. For example, in regarding material substance, classical mechanics includes the properties of mass and length, but not the symmetrical properties of crystals or the colligative properties of solutions. The immensity and richness of actuality compels even the most comprehensive narratives to exclude more characteristics than they include. For this reason, the descriptions of any narrative are always stylized abstractions of reality. Nor is it only knowledge narratives which are characterized by this sort of abstraction. All narratives, even Joyce's *Ulysses* and Proust's *Remembrances of Things Past*, take shape on the basis of radical exclusion of phenomenal detail. The Nigerian philosopher and anthropologist Robin Horton illustrates this narrative principle at work both in traditional African religion and in modern science.

> Thus when traditional thought draws upon people and their social relations as the raw material of its theoretical models, it makes use of some dimensions of human life and neglects others. The definition of a god may omit any reference to his physical appearance, his diet, his mode of lodging, his children, his relations with his wives, and so on. Asking questions about such attributes is as inappropriate as asking questions about the colour of a molecule or the temperature of an electron. It is this omission of many dimensions of human life from the definition of the gods which give them that rarefied, attenuated aura which we call 'spirituality'. It is the result of the same process of abstraction as the one we see at work in Western theoretical models: the process whereby features of the prototype phenomena which have explanatory relevance are incorporated into a theoretical schema, while features which lack such relevance are omitted. [Horton 1971, p. 225]

This idea of "explanatory relevance" suggests a further dimension of conceptual frameworks, namely the inclusion of some basis for conceiving connections between various categories of phenomena and their properties.

4. Interconnectivity: Ten Kinds of Narrative Linkage

Narratives need notions about how the things they classify and describe are connected. "[T]he most usual species of connection," said David Hume, "among the different events which enter into any narrative composition is that of cause and effect." [Hume 1955, p. 34] The relation of causation holds between two events when, given the occurrence of one event, it results in a second. The putative causal event may be either natural or supernatural, and the relation may be postulated either as a general rule as in the laws of chemistry and the procedures of witchcraft or as a singularity as with events in a novel. Causal linkages make phenomena fall into configurations, enabling us to apprehend various items as contributing to an interrelated system of parts or forming an intelligible pattern of events. This showing of things leading to other things distinguishes narratives from mere listings, descriptions and chronological sequences. I wish to consider these cause and effect linkages with regard to five criteria: whether they explain in terms of past or future events, whether these explanations are open or closed in the sense of admitting or not admitting indeterminacies, whether they explain a property of something as due only to that something's parts or due also to the structure by which those parts are organized, whether they explain the whole in terms of its part or vice-versa, and whether between entities they postulate internal or external relations.

a. Teleological and non-teleological explanations

Time's linearity leads to two basic methods of framing narrative connections between events happening at separate moments. Items may be explained in terms of their consequences, as when we say Othello fell on his sword because he wanted to die. Alternately, an explanation may run in the other direction, the consequences explained in terms of some prior event, as when we say Othello died because he fell on his sword. Explanations of the former type are called teleological or functional and find frequent use with respect to human actions. Such usage arises from regarding humans as purposive beings, a view which obliges us to explain their behaviour, at least in part, as a function of wishes to bring about various future events. Consequently, the human sciences abound with narratives which explain operations in terms of their consequences. But the range of knowledge narratives which rely heavily on functional linkage is much broader than this, and it is examples from outside the human sciences that I want to emphasize here.

Functional or teleological narratives interpret processes from the perspective of 'wholes' or systems of interconnected components desiring or designed for the achievement of some end, in other words, a future event. Such narratives focus attention on culminations and consequences, and link the behaviour of each component to the end or purpose of the whole or system to which it belongs. Physiology is a well-known example of a primarily teleological knowledge narrative. It proceeds by identifying the function an organ performs for its organism and how it works to that end. Likewise, more often than not we perceive human artifacts, especially advanced technology, through functional or teleological narratives. A comb is a device for untangling hair; an automobile is a mechanism for getting about in and, sometimes, for impressing one's neighbours. Functional analysis identifies and classifies an entity's parts in terms of their subfunctions. For example, we commonly analyze an automobile into its various

parts – a fuel system, an ignition system, a carburettor, some combustion chambers with pistons, a crankshaft, a transmission, a chassis, a set of wheels, a steering wheel, a breaking system, and seats – and explain them in terms of their contribution to the intended function of the whole. The same kind of teleological account pertains to a system's subcomponents and their operations. Continuing with the car example, a science dictionary tells us that the crankshaft is an "essential component of piston engines that converts the up-and-down (reciprocating) motion of the pistons into useful rotary motion." [Lafferty and Rose 1994. p. 159] The entry then explains how the components of the crankshaft work to this end. Technological culture could not exist without narratives of this type.

Proceeding from the other direction, nonteleological explanations focus attention on the conditions and events preceding the event, process or state of affairs being explained. "They seek to exhibit the integrated behaviours of complex systems as the resultants of more elementary factors, frequently identified as constituent parts of those systems; and they are therefore concerned with traits of complex wholes almost exclusively to the extent that these traits are dependent on assumed characteristics of the elementary factors." [Hempel 1966, p. 93] For example, under this narrative mode the crankshaft's conversion of reciprocating motion into rotary motion is interpreted in terms of the laws of mechanics, the firing of the pistons, and the initial conditions constituted by the crank pins, the connecting rods and bearings, and the crankshaft.

b. Closed and open narratives

Turn now to another, more difficult, and more provocative aspect of narrative linkage, the distinction between determinate and indeterminate explanations. Some narratives are *closed* in the sense that they describe all their events as predetermined, whereas others are *open* in the sense that they admit indeterminacies. Narratives divide between these two categories. Those of the closed or determinate variety claim that give X, Y must follow, whereas open or indeterminate narratives explain Y in terms of X without the presumption that Y *always* follows X. If a field of inquiry is not seen as wholly determinate, meaning that chance, contingency, choice, uncertainty, randomness, or spontaneity enter into the relations between events, then the sets of events open to explanation by the determinate and indeterminate approaches are not coextensive. With these different ranges of application, the choice between the two forms of narrative linkage is one of selecting a method appropriate to the perceived subject matter. As such, this question of finding a suitable narrative form must not be conflated with the metaphysical question of whether reality in general is determinate or not. Traditionally philosophers have lavished attention on the latter question, but for us it need not be at issue. Here we want merely to consider two types of narrative linkage, two conceptual angles offering different vantage points on the field of observation. As I will illustrate, within the same domain of inquiry both types of explanation may prove useful. Like the hammer and saw, the use of one conceptual tool does not preclude the use of the other.

To place these joint notions of open and closed narratives in a more traditionalist context, consider Popper's definition of a physically closed system. "By a physically closed system I mean a set or system of physical entities . . . which interact with each other – and *only* with each other – in accordance with definite laws of interaction that do not leave any room for interaction with, or interference by, anything outside that closed set or system of physical entities." [Popper 1972, p. 219] This definition, when modified as follows, defines a closed or determinate narrative. By a closed narrative I mean an account of a set or system of entities and their interactions with each other – and *only* with each other – in terms of definite laws of interaction

that do not leave any room for interaction with, or interference by, anything outside that closed set or system of entities.

Tolerance for open or indeterminate narratives, however, is very much a modern development. Robin Horton notes that in the traditional cultures of Africa, the concept of coincidence or chance scarcely exists.

> When a rotten branch falls off a tree and kills a man walking underneath it, there has to be a definite explanation of the calamity. Perhaps the man quarrelled with a half brother over some matter of inheritance, and the latter worked the fall of the branch through a sorcerer. Or perhaps he misappropriated lineage property, and the lineage ancestors brought the branch down on his head. *The idea that the whole thing could have come about through the accidental convergence of two independent chains of events is inconceivable because it is psychologically intolerable.* To entertain it would be to admit that the episode was inexplicable and unpredictable: a glaring confession of ignorance. (Italics added) [Horton 1971, p. 250]

But Western culture also has exercised a strong bias against open narratives. This partiality, which until a century and a half ago was hegemonic, owes more than a little to Aristotle. His *Poetics* scorned narratives whose episodes "follow each other without any probable or necessary connection," and applauded the *Odyssey* and the *Iliad* for the manner in which their events are "connected into one event". [Aristotle 1934, Part II, sec. V] With incomparable influence, Aristotle argued that actions "should arise from the structure of the fable itself, so as to be the natural consequences, necessary or probable, of what has preceded in the action". [Aristotle 1934, Part II, sec. VIII] Moreover, "the fable . . . should be an imitation of an action that is one and entire, the parts of it being so connected that if any one of them be either transposed or taken away, the whole will be destroyed or changed". [Aristotle 1934, Part II, sec. V] Determinism as embodied in many scientific theories is but a variation of this ancient sensibility regarding narrative and the connection of events. Newtonian mechanics, especially as reworked by Laplace, achieves perfect "unity of action". Given the positions and velocities of all the particles at any one moment, this narrative's system of equations determines the positions and velocities, and thereby the actions, of all particles for all moments, both future and past. With every event portrayed as part of an unbroken chain of events, if any one of them fails to take place, then the whole scientific narrative would, in effect, "be destroyed".

Horton's example of the falling tree branch, however, suggests that some happenings may not, at least from an epistemological point of view, always best be described and understood as emanating from a single and predetermined chain of events. Observation may repeatedly reveal gaps in such chains or chance convergences of two or more such chains, showing elements of unpredictability or randomness in reality. Historically these indeterminacies have proven no less "psychologically intolerable" to many scientists and philosophers of science than they have to members of traditional African cultures. The willingness of the cultural elites of Western societies to engage with open narratives is an even more recent development than their willingness to engage with democratic processes. Prior to Darwin, no space existed in scientific narratives for indeterminate phenomena. This dimension of reality was barred from scientific inquiry no less than was heliocentric cosmology under the popes. "The doctrine of scientific determinism," writes Stephen Hawking, "remained the standard assumption of science until the early years of this century." [Hawking 1995, p. 59] As a physicist, Hawking thinks of quantum mechanics as the breakthrough narrative, but biologists have the better claim to being the first natural scientists to develop an open narrative that

successfully breached the determinist hegemony. Evolutionary theory from Wallace (1858) and Darwin (1859) onwards relies heavily on indeterminacy as a narrative linkage.

Neo-Darwinism, which combines natural selection with Mendelian genetics and whose advent was roughly contemporaneous with the development of quantum mechanics, exemplifies open knowledge narratives. Neo-Darwinism admits indeterminacy at several levels. It predicates two sources of heritable variation, both conceptually conceived as indeterminate processes. First, the genes of each individual are the result of a random shuffle of existing genetic material (genetic recombination). Second, random mutational jumps occur due to accidents in replication and repair of DNA, accidents now attributed largely to cosmic rays modifying gene structures. Natural selection operates on these randomly shuffled and mutating genes within the field of a changing environment. The evolutionary narrative also treats this form of variation as indeterminate, as resulting from both random non-biological causes – for example, meteorites, volcanic eruptions, continental drift – and from the indeterminate and recursive process of natural selection itself. Modern evolutionary biology includes these indeterminate narrative linkages as well as determinate ones from the laws of inheritance, most especially that *in every case* mixtures of characteristics inherited from the parents do not blend but remain distinct.

Despite the development in the natural sciences of hugely successful narratives embracing "concepts which formally recognize the existence of various kinds of limitation upon the possible completeness of explanation and prediction," [Horton 1971, p. 250] there remain scientists and philosophers who retain a nostalgia for Newtonian certainties. The vision of a clockwork universe – no less than one governed by ubiquitous spiritual agency – is a dream not easily foregone. For those wedded to the metaphysics of determinism, quantum mechanics is but a halfway house to perfect knowledge, while evolutionary theory scarcely qualifies as science, it being so "riddled" with indeterminacies. But metaphysical belief aside, the open narratives of quantum mechanics and evolutionary biology are the biggest success stories of modern science, especially as applied to the practicalities of technology. For better or worse, we live on the eve of the brave new world of genetic engineering, whereas already quantum mechanics, notes Hawking, "governs the behaviour of transistors and integrated circuits, which are the essential components of electronic devices such as televisions and computers, and is also the basis of modern chemistry and biology." [p. 62]

c. External and internal relations

We need to consider briefly a further aspect of causality which impacts on the distinction between closed and open narratives. This is the question of whether or not a narrative admits internal, as well as external, relations. A narrative may be mechanistic in the sense that the internal structures of its fundamental elements are independent of one another, the elements being connected by only external relationships. The classic detective novel, with its resolution worked out in terms of interactions between unchanging characters, exemplifies this type of narrative linkage. So too does Newton's mechanics, where the causal relations of collision and gravity leave the particles atomistically intact. Internal relations, on the other hand, are "identity-affecting". [Bhaskar, 1986, p. 111] Interactions between characters in a literary novel, for example, usually bring about "character development". The description of internally related phenomena has been even more central to the modern development of the natural sciences. This is illustrated by evolutionary theory, which is the story of how the identity of biology's primary units change through interaction.

d. Aggregative versus structural properties

There exist two primary ways of explaining properties. Some narratives explain the properties of things as simply the function of the properties of their parts. For example, engineering treats an object's mass as merely an additive function of the masses of its parts, and the floor space of the Empire State Building as the sum of the floor spaces of its various rooms. Properties explained in this way, I will call *aggregative*. Some knowledge narratives deploy only this approach in their conceptualisation of properties. For example, classical mechanics is based on only three properties – mass, length and time – and with each described in terms of an additive function. Further or "derived" properties are defined in terms of these three primary "dimensions", as for example, velocity is length divided by time, and momentum is mass times length divided by time. Thus, although classical mechanics includes an extensive of list of properties, they all reduce to some mathematical combination of the three primary aggregative properties.

There exist, however, many things possessed of properties which are not properties of their components, but instead come to exist only through the structures by which things are combined. Therefore many fields, and especially the biological sciences, include properties explained as the due to the characteristics of the *structure* by which something's components are combined, rather than as an aggregation of microproperties. The property of being able to see, for example, is explained not just in terms of the various individual cells of the eye and brain – none of which have the property of being able to see – but also in terms of the way those cells are combined. Similarly, human crowd behaviour is understood as depending on the relations holding between the individuals as well as on the individuals themselves. Although it was Newton's dream that some day all of existence could be accounted for in terms of aggregate properties, modern science has tended to involve itself ever more with structural properties. Even physics, with its various field theories, today concerns itself fundamentally with structural explanation.

e. Direction of causation: micro or macro

Reality presents various levels of complexity, running from atomistic individuals to the universe. This polarity entails two possible directions of narrative explanation: accounting for the more complex in terms of the less so or vice-versa. The first approach, "micro explanation", characterizes Newtonian physics and for several centuries dominated the natural sciences. Chemistry, for example, advanced by describing the decomposition of compound substances by chemical processes into simpler compounds or into their constituent elements. But sometimes the object of inquiry begs a macro approach, as when a property of an individual thing appears mediated or determined by the whole or ensemble of which it is a part. The facts that I grew up speaking English instead of Chinese and eating with a knife and fork instead of chop sticks, for example, seem more attributable to the family and society in which I emerged than to any aspect of my individual make-up. Likewise, when I die, although the event will fit some micro explanation such as heart-failure or perforation of the intestine, the complex changes that will then befall the millions of cells out of which I am composed will be seen to be due to the regrettable change in the whole to which they belong.

Because the metaphysics that grew out of Newtonian science was for so long hegemonic, even today there persists pockets of prejudice against the use of macro linkages in knowledge narratives. Yet science has long conceived of some quantitative properties, such as angle and probability, as based on macro relations. Thus any change in the size of a deck of

cards causes every card's probability of being drawn to change. Even more noteworthy is that in physics itself, quantum mechanics has forced through innovations in the use of narrative linkages, placing macro explanation on an equal footing with the older micro variety. The quantum factor, explains the physicist Paul Davies, "denies that the world can be understood in terms of its components alone." Davies continues:

> the reality of the subatomic particle cannot be untangled from the environment it inhabits. . . Evidently the macroscopic and the microscopic worlds are intimately interwoven. There is no hope of building a full understanding of matter from the constituent particles alone. Only the system *as a whole* gives concrete expression to microscopic reality. The big and the small co-exist. One does not subsume wholly the other, nor does the other wholly 'explain' the one. [Davies 1995, p. 39]

C. The Narrative Pluralism of 20th Century Physics

Until the appearance of Einstein's theory of relativity (1905, 1915), Newtonian mechanics with its theory of gravity was unrivalled as the most celebrated theory in the history of science. Its verification by countless experiments and astronomical observations supported the prevailing view of science as a smooth accumulation of facts generated by the application of well-tested theories. So inevitably the discrediting of Newton's theory dismayed and shocked the cultural psyche, traumatizing 20th century thought about scientific advance and fixating its attention on events structurally resembling the Einsteinean revolution.

Initially there was strong resistance to Einstein's new narratives of gravitation and cosmology, Newton's theory of absolute space and absolute time having for so long been accepted as an unquestionable truth. But following the solar eclipse of 1919, when Einstein's predictions were confirmed by two teams of astronomers, there began a cultural shift regarding the nature of scientific progress. Philosophers and historians of science especially faced a new narrative challenge. The historical situation no longer pressed them to account for continuity in science nor permitted them to characterize science as a process whereby new certainties are endlessly added to existing ones. Instead they struggled to identify and describe the processes by which one theory could or should replace or withstand a challenge from another. The first major work to recast the narrative of scientific progress in terms of *competing theories* was Karl Popper's *The Logic of Scientific Discovery* published in German in 1934.

Popper showed that no amount of verification and inductive support can ever prove a theory. Instead every theory always remains vulnerable to refutation and replacement by another. This was a narrative which nicely accommodated the recent astounding events in physics. Popper's account of theory replacement spelled out various methods, including degrees of falsifiability [Popper 1959, pp. 135, 112-135], empirical content [pp. 119-123], degrees of simplicity [pp. 136-145] and degrees of corroboration [pp. 251-282], for judging between competing theories. Under Popper's narrative of scientific discovery, competing theories fight it out on the basis of these criteria of scientific merit, and the "best" one wins.

From the 1960s onwards Popper's version of the new narrative of scientific progress increasingly came under attack. Thomas Kuhn's *The Structure of Scientific Revolutions* (1962) denied the historical efficacy of Popper's objective criteria for theory-replacement, arguing instead that competing theories or "paradigms" are often incommensurable and that sociological factors, rather than epistemological ones, often determine whether one theory is or is not

replaced by another. Imre Lakatos's "Falsification and the Methodology of Scientific Research Programmes" (1970) argued that refuted theories may continue to be used if no better theory exists. Paul Feyerabend's “Against Method” (1970) emphasized that all observation is "theory-laden" and contended that no set of methodological rules can account for theory-replacement and that all knowledge claims are relativistic. But these and other alternatives to Popperian falsification were variations of the basic narrative which had emerged as the natural aftermath of Einstein's revolution. Each added to the collection and interpretation of historical science data to answer questions suggested by the competing-theories narrative. Almost inevitably the decades of debate on theory-replacement has had as its primary effect the deepening and widening of our culture's general perception of scientific progress as the outcome of a struggle between competing theories.

This essay challenges not the narrative of competing theories as such, but rather the hegemony which that narrative maintains over our vision of science. That that narrative fits important chapters in science, including the momentous one which inspired it, is above dispute. But there is much more to conceptual science than just the postulation of frameworks which challenge other frameworks. Formulation of scientific narratives is also about gaining new points of view on domains of inquiry. Viewing the domain from a new conceptual perspective may yield not only additional information but also a new dimension to the understanding of it. The new viewpoint may even reveal fundamental phenomena which were but dimly observable or not observable at all when looking through a prior conceptual system. That such new knowledge may be conceptually incommensurable with that acquired through another narrative lens should be regarded not as a scandal but rather as due to the nature of conceptual thinking. Except in the special case where two narratives make conflicting predictions, incommensurability between narratives does not argue for competitiveness between them. To the contrary, observing a domain of inquiry through more than one conceptual framework is eminently desirable, as is observing Michelangelo's David from more than one standpoint.

Phenomena observed through different conceptual systems may eventually be reconciled through a "deeper" level of theory (like a "bird's-eye view"), as with Maxwell's unification of electronic and magnetic theory. But such unification can never happen except where *narrative pluralism* first prevails for that domain of inquiry.

The narrative of competing theories, especially Kuhn's version, seriously underestimates the scientific imagination, that talent which John Stuart Mill characterized as the faculty for "mentally arranging known elements into new combinations". [Mill 1893, p. 433] Kuhn's narrative assumes that the scientific mind is so deficient in agility as to be incapable of alternating freely between incommensurable conceptual systems. I would be the last to deny that examples of this stereotype exist in every discipline and that in some this intellectual ineptitude may even dominate. Nor do I deny that narrative communities sometimes exist in bondage to their conceptual system because they have failed to make explicit its primary presuppositions. But it seems a cruel travesty of the truth to portray the scientist in general, on the one hand, as an intellectual bumpkin, incapable of shifting between conceptual gestalts and, on the other, as a moral midget, committed primarily to the glorification of a particular narrative point of view rather than to the understanding of the empirical domain to which that narrative and others refer.[1]

For too long historical data from science have been collected, selected and interpreted mainly to answer questions posed by the various versions of the competing-theories narrative of scientific progress. The case for regarding this narrative as a general explanation of scientific

advance has, in its various forms, been constructed primarily on the basis of examples drawn from physics. Yet even here on its most favoured ground it is a simple matter to show that the narrative of competing theories not only fails to account for but also runs counter to most major developments.

In physics today, indeed for a couple of generations now, fundamental research is focused primarily on "unification". Various schemes are used to characterize "the unification process", but all describe a state of affairs incomprehensible in terms of the traditional competing-theories narrative of scientific development. Stephen Hawking, for example, explains the quest as follows.

> Today scientists describe the universe in terms of two basic partial theories – the general theory of relativity and quantum mechanics. They are the great intellectual achievements of the first half of this century. .... Unfortunately, however, these two theories are known to be inconsistent with each other – they cannot both be correct. One of the major endeavours in physics today...is the search for a new theory that will incorporate them both – a quantum theory of gravity. [Hawking 1995, p. 13]

Reading this passage through the competing-theories lens invites total misunderstanding. Physicists perceive relativity and quantum mechanics not as competing theories, but rather as different and complementing conceptual approaches to the fundamentals of physical reality. These two narratives illuminate separate facets of what unification physicists see as ultimately the same domain of inquiry, but which cannot yet be reconciled with each other. The unification dream, with its implicitly deeper level of understanding, arises directly out of the co-existence of the two narratives, the heuristic significance of each being enhanced by the existence of the other. Physicists seek neither to discredit relativity or quantum mechanics, but rather to create "a new theory that will incorporate them both".

Another and more common conceptualization of physics' unification project centres on the four forces of nature: gravity, electromagnetism, the weak nuclear force and the strong nuclear force. Physicists aim to develop a theory which merges the four forces into a single narrative scheme, or, as Hawking puts it, "to find a unified theory that will explain all four forces as different aspects of a single force." [p. 76] The theories of gravity, electromagnetism, and the two nuclear forces, as well as the theory of the electroweak force (a unification of the theories of electromagnetism and the weak nuclear force) are referred to as "partial" theories, because their frameworks of interpretation permit only partial and unreconciled views of the domain of force phenomena. *They are conceptually different ways of looking at that domain, and because they are conceptually different they reveal different dimensions of that domain.* Here again, as with electromagnetism, narrative pluralism is the indispensable prerequisite of fundamental scientific advance.

Shifting between narratives with fundamentally different conceptual systems can be a daily occurrence for 20th-century physicists. The time is long past when one could make a mark in theoretical physics without the ability to move freely between conceptual gestalts. Modern physics requires not only mathematical prowess but also conceptual agility. Unlike theory replacement, unification of narratives for a given domain demands the ability to jump back and forth between three or more conceptual systems: those of the incommensurate narratives and that of the narrative intended to effect the merger. But physicists working on unification projects are not alone in requiring conceptual ability. Today to become a physicist of any kind, one must master the basic concepts of both relativity and quantum mechanics. All the rest of modern physics is derived from one or the other of these two theories *whose conceptual*

frameworks differ radically. Indeed "the basic concepts of relativity and quantum theory," notes David Bohm, "directly contradict each other." [Bohm 1983, p. 176] General relativity conceives of space and time as continuous; quantum theory conceives of them as discontinuous. General relativity conceives of matter as particulate; quantum theory conceives of it as a wave-particle duality. General relativity conceives of physical objects as having actual properties; quantum theory describes them as having only potential properties within the given physical situation. General relativity conceives all physical reality as determinate and all events as in principle having a causal explanation; quantum theory admits indeterminacy and events incapable of causal explanation. Conceptual differences greater than these are scarcely imaginable. In their fundamentals, relativity and quantum theory share little in common as descriptive approaches to physical reality. Yet for most of a century these two metaphysically dissimilar narratives have worked not in competition but in tandem to the produce arguably the greatest advances in the history of science.

D. Anti-knowledge

Robin Horton has categorized the similarities and differences between African traditional thought and western science. He identifies a general principle of divergence.

> What I take to be the key difference is a very simple one. It is that in traditional cultures there is no developed awareness of alternatives to the established body of theoretical tenets; whereas in scientifically oriented cultures, such an awareness is highly developed. It is this difference we refer to when we say that traditional cultures are 'closed' and scientifically oriented cultures 'open'. [Horton 1971, p. 230]

A similar distinction pertains to communities of scholars and scientists associated with various domains of inquiry. Some are *open narrative communities*, in the sense that, like modern physics, they understand and support the epistemological importance of examining a domain from more than one narrative point of view. Others, like traditional societies, are *closed narrative communities* in that they insist that there is only one legitimate way of looking at their domain, all others being taboo. Open narrative communities may be the rule in the natural sciences, but in the human sciences they are few and far between. Closed narrative communities, however, rarely exist in isolation but rather in opposition to one or more other narrative communities focused on the same empirical domain. These oppositions do not create situations like those featured in the competing-theories narrative of scientific progress.

In the human sciences, narrative pluralism – far from being a normal state of affairs – rarely exists except as a temporary truce among mortal enemies. The conflict endemic to these less successful fields of formal inquiry is idiosyncratic and inadequately understood. The Popper/Kuhn narrative of scientific development contributes little to comprehending these domains, where theories "compete", but *not* in the traditional philosophy-of-science sense. Unlike natural scientists, social scientists never need to come up against reality's hard-edged recalcitrances. With rare exceptions, the links between social scientists narrative beliefs and the world around them are conceptually tenuous. Rarely do their domains generate significant falsifiable predictions, making it virtually unknown for a narrative community in the human sciences to reach the point where, in Kuhn's words, it "can no longer evade anomalies that subvert the existing tradition of scientific practice" [Kuhn 1970, p. 6] This freedom to forever evade reality when combined with monist beliefs and true-believer mentalities, leads to various narratives pathologies, of which four are especially important.

1. Narrative cleansing

Closed narrative communities typically live in open hostility toward "alien" narratives. There exists a danger of radically misunderstanding the basis of this belligerence. The despised narratives rather than being "competing" theories in the sense of the Popper/Kuhn story of scientific progress, are complementary theories in the sense of the narrative pluralism of 20th-century physics. Advocates of closed knowledge narratives often publicly embrace an extreme and primitive form of philosophical idealism, whereby they declare that their conceptual framework rather than offering a point of view on an empirical domain, determines the extent of that domain. This can be true even of narratives founded on a strictly materialist metaphysics. Behavioralist psychologists maintain that psychological phenomena not visible through their conceptual lens does not really exist. Horton describes a similar mind-set ("the magical world-view") common to traditional cultures.

> Since he ['the traditional thinker'] can imagine no alternatives to his established system of concepts and words, the latter appear bound to reality in an absolute fashion. There is no way at all in which they can be seen as varying independently of the segments of reality they stand for. Hence they appear so integrally involved with their referents that any manipulation of the one self-evidently affects the other. [Horton 1971, p. 235]

Similarly, the behavioralist claim to universality entails that when it changes its conceptual framework, as it does from time to time, then the domain of psychological phenomena changes also. Those parts and aspects of the domain which cannot be perceived form the current conceptual point of view are said not to exist.

Knowledge narratives deployed hegemonically block or discourage other knowledge narratives and thereby the scrutiny of other aspects of reality. It can be said that this mode of narrative deployment constitutes *antiknowledge*. Consider a hypothetical example. The narrative called "Newtonian physics" could have been deployed (and perhaps was for a while) to block the study of elementary physical phenomena not covered by the Newtonian narrative, such as electro-magneticism and the two nuclear forces. Physicists could have retreated into subjective idealism and refused to recognize as "physical" those phenomena which can not be embraced by the Newtonian narrative. They could have decreed that non-physical phenomena are precisely those phenomena that are incapable of being analyzed with the Newtonian narrative. This kind of radical inversion of the scientific ethos and retreat into ultra subjectivism is common place in the human sciences. For example, a standard economics graduate textbook informs its readers that "*noneconomic* problems are precisely those problems that are incapable of being analyzed with the *marginalist* paradigm." [Silberberg 1990, p.2.] This mindset, which promotes and protects *a priori* thinking and is endemic to today's "mainstream" economics, anthropologists identify as characterizing traditional cultures. Their members, writes Evans-Pritchard, "reason excellently in the idiom of their beliefs, but they cannot reason outside, or against their beliefs because they have no other idiom in which to express their thoughts." [cited by Horton 1971, p. 231] This "absence of any awareness of alternatives" notes Horton, "makes for an absolute acceptance of the established theoretical tenets, and removes any possibility of questioning them." [p. 231]

Daniel Robinson, in his classic study of the history of psychology, describes an important example of anti-knowledge with a structure similar to the one noted by Harden in traditional cultures. Surveying the contemporary scene in American university psychology

departments, Robinson notes that "hardly a vestige" remains of the program of experimental analysis of consciousness from earlier in the century.

> But observe the difference between this shift in emphasis or complete abandonment of interest and the changes that have occurred in physics and biology. We *do* have minds, we *are* conscious, and we *can* reflect upon our private experiences because we *have* them. Unlike phlogiston or the inheritance of acquired characteristics, these phenomena exist and are the most common in human experience. The absence of orthodox Wundtians or Titchenerians or Jamesians, therefore, cannot be attributed to the disappearance of their subjects. Rather, it is to be understood as the result of the inability of the accepted *method* of psychological inquiry to address these subjects. The contemporary psychologist, if only insensibly, has made a *metaphysical* commitment to a method and has, per force, eliminated from the domain of significant issues those that cannot be embraced by that method. [Robinson 1986, p. 398]

Anyone coming from the natural sciences might wonder why social scientists expend so much time and energy "defining" and redefining their disciplines. But this otherwise pointless activity is a natural adjunct of anti-pluralism, it being an easy shortcut to narrative cleansing. The anti-pluralist seeks to establish as off-limits those areas and aspects of the empirical domain not visible from his or her single chosen conceptual vantage point. Laying down a definition which excludes phenomena invisible through that system, works to establish a professional taboo against the extension of human knowledge and understanding to all the rest of that empirical domain. This technique of defining away the unwanted is common to many forms of anti-pluralism. Two notorious examples are the Nazis defining "German" so as to exclude Germans who were Jewish, and America's founding fathers defining "citizen" so to as to exclude Americans of African descent.

A movement that began on the fringes of economics in the 1990s illustrates points raised in this section. The history of economics is diverse but nevertheless anathema to the idea of pluralism. Beginning with the French Physiocrates in the mid 18th-century, economists of all varieties have been inclined to believe that their approach to economic phenomena reveals, if not the whole truth, at least all of it that is worth knowing. It is with these broad conceptualizations, which are called “schools”, rather than with subject areas, that economists, like psychologists, form their primary professional identity. The assorted teachings and members of these narrative schools are labeled orthodox or heterodox depending on whether their school is the dominate one or not. Until very recently economists of all varieties have been comfortable with this quasi theological scheme of things.

But from the 1960s on, neoclassical economists were increasingly successful at purging economics departments of economists who viewed economic reality through other conceptual lenses. This cleansing took place worldwide, a process that accelerated with the rise of neoliberalism, which justifies itself by appeal to the neoclassical narrative.

Traditionally non-neoclassical schools of economics have quarreled among themselves hardly less than with the neoclassical. But in the mid-nineties, faced with near extinction, a peace movement began among these schools. Under the banner ICARE (Confederation of Associations for the Reform of Economics) (later changed to ICAPE , with “Pluralism” substituted for “Reform”) it sought, declared its manifesto, “to promote a new spirit of pluralism in economics, involving critical conversation and tolerant communication among

different approaches". But as these words show, this is a pluralism in the mode of a council of churches, a strategic pluralism rather than the epistemological pluralism of the natural sciences that this essay endorses. Even so, ICAPE's conciliation campaign helped to breakdown among non-neoclassical economists the Popperian-Kuhnian tradition of viewing economics through the lens of competing narratives. This, as readers of this journal know, proved to be prophetic. In the summer of 2000 a group of French economics students circulated a petition that attracted attention from the media in France and subsequently from economists worldwide. The students labeled mainstream economics "autistic" because its allegiance to a single narrative necessarily means that in the main it refuses to look at economic reality. The students called for "a plurality of approaches adapted to the complexity of objects analyzed." Out of this appeal emerged the Post-Autistic Economics movement.

2. Fake pluralism

As a means of fending off criticism of its autism, of further concealing its ideological role (see below), of diverting calls for pluralism and, perhaps most of all, just as a pastime, economics' neoclassical mainstream plays a game of relaxing the assumptions. It loosens one or two assumptions around the edges of the theory and then does a bit of analysis. This is no better than when viewing a sculpture to lean to the left or to the right or kneel or stand tiptoed as a means of seeing another side of the work. Yet the whole mainstream project is now so infected with this methodological dilettantism that it seems necessary to spell out the difference between fake and real pluralism.

Even more than with a word, the meaning of a concept is it use. The meaning of a word depends upon the referent of the sentence, which as Wittgenstein noted is a "state of affairs" [*Tractatus Logico-Philosophicus* 2.01, 2.001, 2.02,]; likewise the meaning of a concept depends on the framework in which it appears. For example, take something so simple and straightforward as the concept of economic growth defined in terms of GNP. When you transfer this concept from the neoclassical framework which views the economy as a closed system that includes the ecosystem ("land, labour and capital") to the conceptual framework of ecological economics which views the economy as an open subsystem of the ecosystem, this concept's meaning, in all its dimensions, changes fundamentally. It also changes fundamentally when transferred from the masculinist neoclassical framework to a feminist economics that ascribes economic value to production not entering into market relations, for example family-provided nursing and child care. Each of these three conceptual frameworks, having the limited point of view common to all such creations, identify and describe a different "state of affairs". These examples illustrate two fundamental points: One must think from *inside* a conceptual system in order to:

1. grasp the meaning of its concepts and
2. to gain the vantage point that it offers on the world.

It is only when you shift from one conceptual system to another, *like physicists do*, not when you relax some assumptions of one system, that you have real pluralism.

3. Narrative inversion

A knowledge narrative may become *invert*, meaning that instead of being used mainly as an instrument for explaining reality, its focus becomes itself. Turning away from the empirical

phenomena that inspired it, it becomes transfixed with its own existence. This may take the form of formalism, where the narrative's empirical content is subordinated to the articulation of formal devices, where a language "refers to the observer's logic but not to the subject" [Piaget 1973, p. 25], as in much recent economics and political science, or with an obsessive hermeneutic interest in "reading" and interpreting the formative texts of the narrative, theology being the supreme example, but with psychoanalysis sometimes not far behind.

In subject areas where experimentation is difficult or impossible, mathematical models may have no connection with the concrete or empirical world. Symbols in the equations, instead of referring to measurable quantities, may be only imaginary placeholders, like "Monopoly money" is imaginary money. In these cases – and they are especially common in economics – the models are merely play things, "being no more than a play of mathematical relations" [Piaget 1973, p. 25], referring only to those relations themselves, rather than to relations in the empirical world. The practitioners are not "engaged in forging tools to arrange and measure actual facts so much as making a marvellous array of pretend-tools which would perform wonders if ever a set of facts should turn up in the right form." [Worswick 1972, p. 79] In economics the inversion often goes even further. There exist branches of economics that differ from branches of mathematics only in two respects: they are of no real mathematical interest and some of their axioms and terminology may have in the distant past been related to some empirical question. In these pursuits, so favoured by promotion and grant- and prize-giving committees, further assumptions are made willy-nilly to facilitate mathematical manipulation rather than from any desire to simulate reality. And by varying the empirically empty assumptions, thereby generating an endless range of conceivable logical possibilities, a virtual infinity of "models" can be fabricated, each generating one or more publications and all impregnable to empirical critique – a scientist's nightmare, but a careerist's dream.

4. Concealed Ideologies

A conceptual system defines, at the exclusion of others, a point of view toward its object of enquiry. For the human sciences this fact poses a moral danger. Their conceptual systems relate to their objects of enquiry in two ways that invite them to play an ideological function as well as an epistemological one. Both of these relations are recursive. First, a social-science conceptual system can alter the objects of its enquiry by becoming part of the conceptual and belief apparatus through which humans define themselves, perceive others and make choices, thereby changing the structures and propensities of the human world. With the spread of mass higher education, this recursive phenomena becomes more common, pervasive and profound. Second, unlike the natural sciences, the human sciences are ultimately a means from on high of preserving or reconstructing the basic realities that they study, these in total being the human project. Different conceptual systems present different sets of choices, real or imagined, to be chosen and acted upon by human populations at large. It can never be the case that each of these sets of choices will equally favour every group in society.

This means that, regardless of value judgments, it is the nature of all social theorizing, economics being no exception, to favour some groups in society over others, so that any attempt to block enquiry and analysis from multiple theoretical perspectives, i.e., anti-pluralism, is an ideological move.

Since Napoleon's popularisation of "ideology" in a derogative sense, many commentators have attached various meanings to the word, meanings inspired partly by shifting historical and social contexts, partly by a desire to make the phenomenon intelligible from more than one conceptual viewpoint and partly also, of course, by ideology. But the common presumption of these formulations has been that an ideology is necessarily manufactured and/or disseminated, consciously or unconsciously, with an ideological end in mind. The presumption of intent holds not only for the concept as developed in the negative sense by Marxist and non-Marxist writers, but also for Mannheim's neutralized concept which identifies ideology as a distinct type of cultural formation, functionally indispensable in non-traditional societies. But the preceding taxonomy of differences in conceptual systems shows that the element of intent is not a necessary condition for an economic theory to function as an ideology. Each conceptual system for a given human field necessarily offers a different viewpoint of that field, and thereby suggests different possibilities for shaping, directing and organizing it. Consequently, if for whatever reasons, one conceptual system's partial view is made the only view on offer, its influence on shaping human experience in a particular direction will be no less than if it had been designed to do so. *Where there exist a plurality of conceptual systems that illuminate different dimensions of a social object but the teaching of only one system is permitted, that system functions as an ideology.*

One must be careful here not to fall into a logical hole. Because every possible conceptual system can view its social object only from a particular point of view, it is self-defeating to equate ideology with systematized bias vis-à-vis the social realm, lest the social sciences are to be regarded as but a subcategory of ideology. The test of whether or not an economic theory is ideological is not its essence nor how and through whom it came to be nor who uses it. Instead the test is *how* it is used. A knife can be a deadly weapon or a tool for preparing the family dinner. Likewise an approach to economics can be an exercise in ideology or a tool for the advancement of understanding. A conceptual system regarding human affairs becomes an ideology when its partisans refuse to countenance the use of other systems as well, as when a group of economists refuse to teach their students how to view the economic realm from conceptual points of view other than the one that they favour. It is important to note here how the epistemological and ideological dimensions relate. *An economic theory becomes an ideology precisely at that moment when its partisans decide to curb the growth and prevent the dissemination of knowledge of how to see all those aspects of the economy that their approach leaves in the dark.* In economics ideology comes about mostly through the way it is taught, so that the primary agents of ideology in economics are not theorists and technical practitioners, but rather the teachers and, most especially, the authors of textbooks.

E. Summing Up

Even more than physics, modern medicine, where the general practitioner shifts freely between knowledge narratives, exemplifies the antithesis of the monistic approach to knowledge that characterizes traditional societies and many human sciences. The germ theory of disease, along with psychosomatic, genetic and life-style explanations of disease are each a family of narratives, and between which the competent doctor shifts freely back and forth in seeking a true and full explanation of his or her patient's complaint. These narrative families have overlapping domains – for example, diet (not enough red wine and too much butter) and stress (not enough leisure and too much aggro) contributing through bio-

chemical processes to genetic susceptibility to heart disease. But there is no yearning or pressure in the community of medicine for a reduction of its many knowledge narratives to a master narrative, nor for a unification of narratives as in physics. Instead the medical community understands that its multiplicity of narratives for explaining disease and its absence is needed to serve the complexity of medicine's empirical domain. Indeed, it is almost self-evident that the ill-health and good-health of the human organism are causally more complex that the fundamental properties of the physical universe, and, therefore, not open to narrative unification. It should be self-evident that this is even more true of the socio-economic realm.

If the human sciences are to be a constructive part of the human conversation, they must be willing to adjust the conceptual vantage points of their narratives both to fit changes in the topics of that conversation through time and to illuminate the diverse perspectives of its participants. Above all, the conceit that because one is a social scientist one is blessed with a privileged or God's-eye view of the human world must not be indulged. Richard Rorty's injunction to philosophers is no less apt for social scientists: "to be rational is to be willing to refrain from . . . thinking that there is a special set of terms in which all contributions to the conversation should be put – and to be willing to pick up the jargon of the interlocutor rather than translating it into one's own." [Rorty 1980, p. 318] Epistemologically this is the recognition that a plurality of narratives enriches our understanding of any sub-domain of the human project, that, whereas in the special case such narratives may be incompatible, in general they are complimentary and their plurality essential to the advancement of knowledge and the good health of society.

Endnote

1. It is not generally appreciated how much the popularity of Khun among people in the humanities is due to the satisfaction, sometimes glee, they take in what *they see* as his portrayal of the scientist as implicitly intellectually inferior to themselves. Your typical university literature lecturer, for example, thinks nothing of in a morning shifting through a whole range of gestalts (Marxist, Freudian, historical, New Criticism, deconstructionist, etc.) in interpreting a literary work.

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