Committee I
The Unity of the Sciences
#29

Draft-For Conference
Distribution Only

THE UNIFICATION OF SCIENCE THROUGH THE ECONOMIC APPROACH--FACT OR FICTION?

by

Naomi Moldofsky
Professor of Economics
University of Melbourne, Australia

The Twelfth International Conference on the Unity of the Sciences
Chicago, Illinois November 24-27, 1983

"Labouring the differences between science and the humanities has long been the fashion, and has become a bore. The method of problem solving, the method of conjecture and refutation is practised in both."
Karl R. Popper

"The Scientist acts in embarking upon his research work, but in the orbit of natural events of the external world which he explores there is no such thing as action."
Ludwig von Mises

I. INTRODUCTION

Can science be unified through the economic approach? This very question, combining the ideas of a unified science with a distinctive economic approach, suggests a remarkable turn in thinking, especially over the last half century. For whereas only yester-year the idea of a unified science was understood as a denial of human action, hence as an assault on economics as an independent discipline, today this very same discipline appears in the forefront as a potential unifier of science.

Historically, first the unprecedented success of the natural and biological sciences, then the birth of sociology, appear to have evoked, at least, two diverse responses. In one direction, it was considered "a vain conceit of man to presume that his conduct is not entirely determined by the same impetuses that determine the behavior of plants and dogs."[1] It led to the wholesale imitation of, what was seen by the various brands of positivists, the method and language of science, a method which, as argued vigorously by Karl Popper,[2] can never be put into practice. Positivism entailed inductive generalizations and the supposed avoidance of conjectural theorizing in the description of the external world; all other methods of rational discourse were qualified as metaphysical, in the sense

of nonsensical. Almost parallel with this (though somewhat later in time) and coincident with Auguste Comte's notion of 'sociology', came the positivists' onslaught on economics as an independent discipline; it was to be robbed of its distinct approach and turned into a sub-discipline within an over-all theory of society. The apparent intention was to handle social problems in the same way and with the same supposed exactitude and success as were technological problems.

In the other direction, these very same developments appear to have sharpened the awareness of the anti-positivists among the social scientists (for example, 'Austrian' economists) to the valuable contributions which economics, as an independent discipline, could make to the study of society. Aware of the fact that, notwithstanding their enormous success, the natural and biological sciences did not really contribute to the better understanding of social processes, these dissenters cited human action as the mark distinguishing between the domain of the social/human sciences and that of the natural and biological sciences. They went on to reason that such reflective and volitional action, entailing choice among the various available courses, was of sufficient importance to warrant a dualistic approach to science. At the heart of these arguments lay the reasoning that human action is open to analysis and understanding only because man, the object of study, has a mind of a structure similar to that of the scientist conducting the investigation; without such a similarity of minds, no communication is possible. Within this world view, the imitation of the physical by the social/human sciences is likely to be meaningful only when the investigating scientist is able to know the inner aspects of the objects studied.

The continued, even increasing fascination which quantification and measurement would seem to hold for many an economist, coupled with some sort of compulsion to seek for verification of results, especially of the probabilistic kind, suggest that the above tradition - imitation of the physical sciences - is still very much alive in the world of economics. What is perhaps somewhat novel here is the increasing tendency, by other social scientists and biologists, to apply this sort of an economic approach in their respective disciplines, and to view this approach as a potential unifier of science. The question of whether the idea of a unifed science can, under the circumstances, be extricated from the above mentioned disrepute brought upon it, especially by the exploits of the various brands of positivism, would seem to be of sufficient urgency to merit examination.

II. THE PROBLEM

The suggestion that a discipline such as economics, fragmented by considerable compartmentalisation masquerading, at times, as internal specialization, serve to unify science may seem somewhat far-fetched. Indeed, there are perhaps as many formulations of the economic approach as there are schools of economic thought, each resting upon a different pronouncement of rationality and a diverse view of the scope of economics as a science. At the root of this apparent lack of cohesion would seem to lie an almost total disconcern with epistemological problems and, possibly because of this, a tendency to evade some basic economic problems. Therefore, when considering any such an approach as a potential unifier of science, the need to distinguish fact from fiction, and refrain from intermingling the two, is perhaps imperative.

This essay intends to probe the proposal of a unified science through the economic approach. This does not mean to suggest that all disciplines are to be studied by means of some specific economic methods, but only that certain core features of the economic approach may possibly be shared by all disciplines and may thus shed greater light upon such problems as are perhaps also shared by all the disciplines. In other words, the intention here is to tackle the opening question of this essay, and to explore the unifying potential of the economic approach (and its methodological value).

In Part III below, that economic approach which views rationality as consistency manifest in maximizing behavior by an image of economizing man in equilibrium situations is examined. This approach seems to have attracted much attention and considerable support for its supposed ability to stretch the boundaries between a number of disciplines within the social sciences, and between these and the biological sciences. A detailed review and analysis of the relevant studies is not undertaken; these are numerous, varied, and well documented in the literature. The intention is rather to highlight the consequences of, what would seem to be, an uncritical intermingling of fact and fiction. To that end, attention is focused upon the main assumptions and conceptual analytical tools which may be taken to constitute the core of this approach, and on their implications for the practice of science. Additionally to shedding light upon the feasibility of this approach as a unifier of science, these may also draw attention to the relationship between the methodological norms employed and the results sought.

In Part IV of this essay, an alternative approach which views rationality as human action is examined. The best developed models of rational problem solving may perhaps be found in the methodology of scientific research, and of economics as a science. The view of human action as the bridge most likely to link this economic approach with the activity of science therefore bears investigation. To put this all somewhat differently: If 'rational problem solving' as the method of science (linked with the Popperian thesis of 'the closer approximation to truth' as the aim common to all scientific endeavor) centres on human action as rational action, and if economics is the most developed branch of the science of human action (i.e. praxeology), then perhaps that economic approach which centres on human action as rational action may be of value in any consideration of the unity of science as a unity of method, in the sense of rational problem solving. This model of rational problem solving was generalized, perhaps above all, by Donald Campbell[3] into a model of 'blind-variation - and-retentive-selection.' If this grounds 'evolutionary' epistemology, then perhaps this new discipline may be helpful in linking together the insights on the biological and cultural evolutions, gleaned by Bernard Mandeville and the Classical Scottish philosophers, extended by Carl Menger, and developed further by Friedrich Hayek, and enable us to bring it all back to the level of science via the Popperian approach, and, finally, back to human action as the possible starting point of all scientific endeavor.

III. THE ECONOMIC APPROACH AS A SCIENCE OF HOMO OECONOMICUS

"It is vain to talk about experience without reference to the factor that enables man to have experience."
Ludwig von Mises

1. ECONOMIC MAN

Homo oeconomicus - a calculating, rational maximizer who will settle only for the very best - is pivotal to this economic approach where rationality is understood as consistency in this sort of behavior.[4] Accordingly, any human decision implies calculation of its costs and benefits, or penalties and rewards, directing the agent's efforts to maximize his utility, profits or whatever. This interpretation of rationality is assumed to embrace practically the entire spectrum of human behavior. Indeed, it would seem to have inspired a wide range of research programmes extending over areas as diverse as marriage, fertility, divorce, health, education, voting behavior, search for information, adversary situations, corruption, crime, racial discrimination, labor-force participation, use of time, statistical

decision-making, religion, constitutions and institutions; it even enters the bedroom where, as one researcher confesses, "he would read in bed at night only if the value of reading exceeded the value to him of the loss of sleep suffered by his wife."[5]

Historically, emerging out of Max Weber's ideal type of rational action, the model of the calculating economic man, conscious of the ends-means dichotomy, gave rise to a number of views of economic science. One such view focused on the idea of economizing, in the sense of the most efficient use of known available resources, as the cornerstone of economic science. It went on to define economics as "the science which studies human behavior as a relationship between ends and scarce means which have alternative uses."[6] Stressing a given hierarchy of competing ends, this view regards the economic problem confronting each decision maker as that of maximizing satisfaction in terms of the most efficient resource allocation attained by selecting those given scarce means that will facilitate the fulfilment of as many of such ends as possible.

The problem of scarcity and the act of economizing scarce means in relation to numerous, variously valued, ends in an equilibrium situation, forms the core of the above Robbinsian view of economic science. Market general equilibrium corresponds to economizing at the level of the individual; such equilibrium is assumed to depend upon the successful coordination of individual market activities so that, under the circumstances, no single individual plan need fail to be coordinated As for tackling the problem of scarcity, a maximizing pattern of behavior intended to get the most for the least is expected of every economic agent, culminating in the maximization of 'satisfaction' which may come to replace the entire hierarchy of given varied 'ends', as the ultimate end.[7] Choice is viewed here as a means for solving the maximizing problem; the agent selects those courses of action which he thinks will maximize his utility, his profit, and so on. Both economizing and maximizing can be performed in widely differing situations to facilitate analysis, and both cut "across many traditional boundaries"[8] to permit the inclusion of behavior formerly excluded from the sphere of economics, but only so long as such behavior occurs in conditions of scarce resources allocated among competing ends. Methodological individualism, requiring phenomena and events to be traced back to valuations and actions of individual agents, and the insight that the market emerges out of the interplay of innumerable human actions, remain consistent with this view of economics.

2. THE 'NEW' ECONOMIC APPROACH

From the perspective of the broader view of economics as the science of human action (also influenced by Weber's ideal types, though in a different way, and discussed in Section IV below), the Robbinsian view is said to offer a narrow aspect of human behavior, incomplete and even misleading, transforming economics from a human science into "applied mathematics and engineering."[9] Notwithstanding such criticisms, an endeavor was made over the past few decades to distill out of the Robbinsian allocation programme, what is claimed to be, a uniquely powerful economic approach, capable of intergrating a wide range of human behavior (see pp.4-5 above) so much so, as to have 'earned' it the title of "the new economics."[10] It is said to have advanced economic theory considerably and to have enabled economists to apply successfully their analytical microeconomic tools to many fields that were traditionally viewed to be outside the sphere of economics; that it can explain all sorts of behavior and give it a unified interpretation, not just within the market sector, but also outside it.[11] Indeed, applying this 'new' approach, a large body of research has been developed and applied by economists, other social scientists and biologists, to a varied set of problems ranging from questions of the evolution of language[12] to questions of whether economics and biology constitute a single branch of knowledge, whether biology is itself but natural economics[13] or, since economizing, as is assumed, is exercised by bumblebees and scientists alike, whether economics may help us understand "how they do what they do."[14] The claim that this approach has numerous implications that could be falsified makes it all the more exciting.

What has been altered here regarding the 'new' economic approach, and what has remained unchanged? One notable change relates to the decision to avoid disputations over tastes by treating these as "stable overtime and similar among people" - "De Gustibus Non Est Disputandum."[15] Human behavior is considered to be explainable, preferably, by a general calculus of utility-maximizing behavior[16] with search of information as a possible solution, that is, choosing an optimal programme of resources in relation to a given ranking of ends, but leaving out the customary qualification 'tastes remaining the same'. This is intended to secure falsifiable predictions about behavior and to cut out explanations based upon subjective activities of the human mind, especially changes in tastes due to new information, a lack thereof, or even just caprice.

The above newly introduced assumption of 'stable preferences' is added to the older assumptions of 'maximizing behavior and market equilibrium', and together these are "to be used relentlessly and unflinchingly" by economists intent upon studying and explaining behavior in its various ramifications. However, the basic problem to be solved continues to remain that of how to get the most efficient resource allocation bedevilled by scarcity and the need to choose. The criterion of choice is considered to be the same everywhere and to consist of benefits - monetary and/or psychic - expected to exceed those available in alternative occupations. In other words, rationality is still viewed in terms of the consistent, conscious weighting of alternatives for decision-making. Solutions to this basic problem continue to be sought in terms of maximizing utility functions or profits or whatever, in equilibrium conditions. With given ends ordered beforehand, in as much as these may appear as a single end, the problem may seem more like a technical, than an economic, problem (concerned with a multiplicity of ends) to suggest an automatic manipulation of resources;[17] add to this a selection of means directed towards their attainment, and the optimum position is implied in the data. Faith in this 'new' approach would seem to be so great that some textbooks go so far as to counsel the aspiring student of economics that, when facing any problem, were he to ask himself: "is this an optimizing problem or an equilibrium problem? he will rarely find himself going wrong."[18]

3. THE 'UNIFYING' CHARACTERISTICS OF THE NEW ECONOMIC APPROACH

In terms of expectations, what are the supposed gains from the consistent application of this economic approach and by what means are these to be attained? Combining theoretical with empirical analysis, the 'new' economic approach is said to be doing "certainly far better than any alternative" economic approach, and is expected to provide a useful, valuable, unified framework for understanding all human behavior; it is thereby expected to achieve that which had eluded Bentham, Comte and Marx, among others.[19] This, as is argued, has made economics today more "with it", that is, more relevant than it was earlier this century, and to have strengthened its structure primarily "because of the need to adapt the theory to novel situations."[20] As for its methodology, Milton Friedman's instrumentalist approach to theories, that is, the view that the realism of their assumptions is of no great moment, since theories are of interest primarily for the purpose of predictions,[21] is adopted, along with the underlying assumption that social interactions are capable of quantification and empirical testing.

From the viewpoint of social scientists other than economists, the attractiveness of this economic approach would seem to reside in the combination of the simplicity, yet 'robustness' of its theories with the sophistication of its technical methods, including econometrics, social cost-benefit analysis and the like, to permit the exploration of the "more quantifiable sector of society."[22] It is such real or apparent 'vigor and rigor' which has enticed practitioners of these other, 'softer', disciplines to try to emulate the methods and techniques of the 'new' economic approach.[23] Fundamentally, however, it is the supposed ability of this economic approach to tackle the universal problem of scarcity which is assumed to make it such a strong contender as a 'unifier of science'. Indeed, economic theory is viewed within this approach as being well on its way to provide "a unified framework for all behavior involving scarce resources, non-market as well as market, non-monetary, as well as monetary, small group, as well as competitive."[24] The basis for the expectation that such a pending unification process is likely to embrace most of the social and biological sciences would seem to reside in the view that prices of any kind - money prices of the market sector, and imputed 'shadow' prices of the non-market sector alike - may act as measures of the opportunity cost of using scarce resources; the 'new' economic approach predicts the same kind of response to 'shadow' as to market prices. To see whether such expectations are based on 'fact' or just on 'fiction', requires that the 'new' economic approach be subjected to scrutiny.

4. THE 'NEW' ECONOMIC APPROACH - EVALUATION

If gaining better insights into behavior under the constraint of scarcity is an important aim of this approach, then its fruitfulness may be judged in terms of whether it is/is not likely to contribute to our substantive knowledge of such behavior. In as much as this approach is conceived within a competitive equilibrium framework both, approach and framework, are subject to the same sorts of limitations and problems concerning real world applicability, and their predictive contents must, to a large extent, depend upon the assumption of certainty[25] and adequate knowledge. In what follows below, the focus is, not on specifics, but on the broader, more fundamental characteristics of this approach to highlight, in particular, some of its problems and limitations.[26]

AN EQUILIBRIUM FRAMEWORK

Timeless statics and mechanistic behavior would seem to form the quintessence of a world of equilibrium inhabited by economic men, driven exclusively by economic motives, to

obtain the best available advantages. It excludes the surprises of real life situations along with the problems of unanticipated change. Instead, it ushers in stable processes, knowledge that is always adequate for decision-making, and certainty (or at least, the kind of uncertainty that is amenable to the calculus of probability) to facilitate maximizing behavior. With given patterns of ends, reflection and purpose are practically eliminated from economic acting; the allocation of resources amounts here to a mere re-arrangement of means to match them with such given ends - a mechanical rather than reflective manner of conduct. In other words, if the entailed selection of an optimal programme of resources using a given ranking of goals be considered as choice behavior, then it is a weak, diminished form of choice.

The equilibrium framework and any approach based upon it, or any theory nurtured within it, would thus seem to abstract from all human mental activities, hence from reflective, purposeful conduct. It consequently banishes, at the outset, unfulfilled expectations, discoordination, error, learning from experience, and the like, to deny any role for human action. The human individual is simply reduced to "measure zero"[27] so that interrelationships of such individuals may invite quantification and objectification; markets - the outcomes of such interrelationships - are made to assume the nature of technical allocative mechanisms. With perfect (or even adequate) foresight, the necessary conditions for continuing equilibrium would be automatic, suggesting that such mechanistic markets have a built-in tendency to equilibrium. When the effective operation of such markets is judged in terms of the optimality of their allocative powers, as is within this economic approach, institutions such as the price system, for example, may be dispensed with: the market may then be considered as merely one allocative mechanism among a number of other likely possibilities, such as a central planning board, Walras's auctioneer, and the like. This may perhaps explain why and how 'shadow' prices are lumped together with market prices in the 'new' economic approach where theories are assumed capable of explaining and predicting behavior within market and non-market sectors alike (see p.8 above).

Evidently, the equilibrium framework is not just a convenience for the 'new' economic approach, but the very foundation upon which it erects its entire edifice. Without it, the twin assumptions of 'maximizing' and 'stable preferences' would be meaningless, as would be also most of the conceptual tools utilized by this approach, be they utility functions, social

costs and benefits, and the like. Some of the gains and losses associated with the choice of equilibrium as a fundamental postulate for this economic approach, and the effects which these may have upon its viability as a unifier of science are examined next.

STABLE PREFERENCES AND MAXIMIZATION

As just noted, the gains in question relate almost exclusively to the fundamental assumptions and conceptual tools employed within this approach. For example, the double-assumption that all human behavior reflects a single minded attempt to 'maximize' constrained utility or some other function subject to uniform 'stable preferences', depends entirely upon the certainty of a world of equilibrium, a world exclusive of reflective, purposeful action. 'Stable preferences', attributed to the vague notion of 'human nature' or 'self-interest', assumes away the autonomy of expectations so as to make them dependent on past experience. While permitting the relaxation of the assumption of certainty to admit uncertainty, it facilitates the use of the calculus of probability as a tool concerned with group events to contend with such uncertainty', genuine Knightian 'uncertainty' (see n.25) continues to be excluded, if only because it clashes with the basic characteristics of equilibrium.

Similarly, 'maximizing' activities can also be meaningful only in a model postulating perfect foresight, that is, the certainty of a world of equilibrium devoid of human reflective action, so that complex problems entailing numerous variables may be tackled successfully. I draw here on Tintner's insights[28] that under genuine Knightian 'uncertainty' each action that may be chosen has, not a unique outcome, but a distribution of potential outcomes that are overlapping. When such action takes place only one such potential outcome, and one which cannot possibly be foreseen, will materialize. The upshot of this is that whereas aiming for 'maximimum profits' or 'maximum utility', in the sense of the largest outcome that could have been realized from available actions, is meaningful, not so aiming for "profit maximization" or "utility maximization" as a criterion for selecting among alternative actions, each of which may have a distribution of outcomes that overlap. To render these meaningful, certainty is required to exclude imperfect knowledge and foresight, and with these, diverse tastes, interpretations and expectations, for not only does such diversity prevent the successful tackling of complex problems involving numerous variables, but it limits the possibilities of abstraction of the kind required by the 'new' economic approach.

EFFICIENCY

Among the more important conceptual tools utilized by the 'new' economic approach, 'efficiency', 'cost-benefit' analysis, and especially the idea that such costs/benefits may assume social dimensions, are entirely 'creatures' of the mental tool of general market equilibrium. In the following brief discussion attempting to highlight some of the problems pertaining to the relationship between the conceptual economic tool of 'efficiency' and aims such as the enforcement of law, property rights, etc., I draw, in particular, on arguments within the perspective of modern 'Austrian' economics.[29] To explain 'efficiency' as the best combination of means - resources - in pursuit of a given hierarchy of ends, is meaningful only in an equilibrium framework. From an economic, as distinct from an engineering outlook, 'efficiency' is a value concept, defined in terms of the preferences and expectations of individual market participants; it exists only in relation to certain aims. This raises the important double question: what aims and whose? In real life situations, individual human beings tend to have different valuations, hence different aims, thus rendering the notion of social 'efficiency' or, for that matter, even of individual 'efficiency', meaningless, if only because being efficient requires of the individual to have adequate knowledge and full foresight, not only of his own future actions, but of the actions of those with whom he interacts. In other words, it requires an equilibrium situation, for only here may disparate aims dovetail; it is only in general competitive equilibrium situations that we may speak of 'efficiency'. However, once we remove this stricture, we usher in 'real', acting, choosing men to replace our imaginary 'economic' men. Such acting men may not only learn and improve their knowledge, but are also free to be themselves, that is, to alter their valuations, expectations and actions, not only in accordance with their state of knowledge/ignorance, but also in accordance with some whim, fad or fashion. Here ends can no longer be taken as given; they may and do change, rendering the idea of 'efficiency', as the best combination of means to attain a given hierarchy of ends, rather empty.

When extending the notion of 'efficiency' from a market to a non-market context, be it to social institutions or even decisions, whether in the political arena, the realm of the common law or the domain of property rights[30] it becomes ambiguous, meaningless, and downright fallacious. If, as noted above, 'efficiency' must be made relative to the goals sought, then in a non-market context, whose aims is it to be made relative to, and how are

these to be selected? The objectives can be pre-selected only arbitrarily. As to whose aims to select, we end up with the conclusion that in politics 'efficiency' is made to relate to the aims of the politician's constituency, and in law, to the aims of the judges or of those who make use of courts and associate resources. To speak of 'efficiency' in a non-market context, is surely to confuse the issue and hamper, not enhance, our understanding of behavior.

COST-BENEFIT ANALYSIS

To establish 'efficiency', attempts are made to identify those actions in which benefits are perceived to exceed costs. In any cost-benefit analysis, costs as well as benefits are viewed objectively, the aim being to identify, evaluate and aggregate the consequences of any action to facilitate choice of such solutions as would maximize benefits, individual as well as social. To be able to do this, however, it is essential that the distinction between sunk costs and marginal costs, that is, between costs that are bygones and costs that are expected in the future, be of no consequence. This can be so only in a world of general market equilibrium, where adequate knowledge or perfect foresight ensure a world free from error, hence a world of certainty about expected outcomes. Here the prices of resources would keep changing until such time as they came to reflect accurately the values of alternative uses of such resources to market participants. But we do not live in a world of general market equilibrium; the moment we move into the real world of change and uncertainty, costs can no longer equal payments made to resources. Here human beings are hampered by imperfect and incomplete knowledge and foresight and may end up with erroneous expectations upon which market prices may form. It is then up to decision makers to correct their errors and alter their plans in a market situation.

Drawing, in particular, on the LSE Essays on Cost31 we may note that in as much as costs are assessed in terms of opportunities foregone they concern anticipated utilities and are, therefore, open only to personal evaluation. A subjective, ex ante concept, cost cannot be measured, aggregated or compared interpersonally. As soon as individuals are permitted choice, so soon do they end up having diverse plans, preferences, and also costs, that is, different perceptions of alternative sacrifices; here a simple, coherent version of social cost (or benefit) makes no sense at all. Even the possibility of handling the problem of uncertainty, that is, reducing it in the real world with objective probability theory is ruled

out,[32] if only because historical events are unique and non-repeatable; objective probability theory does not apply here. All that can be done under the circumstances is for individuals to estimate subjectively their own costs, that is, the value rating of their respective highest value foregone due to making the particular choice. Once such choice is made cost, as an ex ante concept, is no longer open to scrutiny. Like utility functions, costs do not exist independently of choice actions of individuals in an exchange process; neither can they be observed by others.

So long as the intention is to explain market behavior and to make conditional predictions about the direction of change within the market, the identification of costs with market resource prics may well be "a useful fiction",[33] as is the equilibrium upon which this is based. The validity of cost-benefit analysis, however, depends on how firmly such costs and benefits are based on preferences of individuals expressed through the market. As for any notion of social or aggregate cost or even an individual's objectively determined cost, like 'efficiency', these too are mere fiction. To conduct cost-benefit analyses in the non-market context of legal or political institutions or decisions, is neither valid nor meaningful. Remaining very much an area where value judgments are paramount, for the analysis to be convincing, it must pay attention to the pricing environment within the context of which it is placed. Market prices - the offshoots of reflective human interactions - cannot possibly be "constructed synthetically, as it were."[34] 'Shadow' prices are, not real, but only a mere image of market prices. If they are estimates of true opportunity costs, as is generally contended, that is, costs that are subjective, the question: whose costs? cannot possibly be ignored. The verdict, following some intense scrutiny, was practically unanimous: " it appears most unlikely that its [cost-benefit analysis] use is going to solve a broad range of problems in the immediate future."[35]

THE 'NEW' ECONOMIC APPROACH AND 'REALITY'

Given the primary position of equilibrium within the 'new' economic approach, the two would seem to stand or fall together. Once we remove the assumption of equilibrium, the entire edifice - the 'new' economic approach - crumbles and collapses. Yet were we to retain it, then the limitations and criticisms applicable to the equilibrium approach would apply equally to this economic approach. To assume that we may move freely from the fictional, static, mechanistic world of equilibrium to the reality of a world of change and uncertainty is

to perpetuate, what some have termed, the "most sophisticated fallacy of economic theory."[36] Amidst the uncertainty of the real world context, the assumptions and conceptual tools employed in an equilibrium context collapse, as just argued, into meaningless fiction.

Within the equilibrium framework, any prediction pertains, not to what actually happens, but to what is designed specifically within the confines of the particular model, a model that violates the nature of the real world, the nature of the human decision-making unit, the economic decision making process itself, and economic science. Constrained by given ends and means, choosers are not permitted to reflect upon the choice of ends, nor to be alert to new opportunities for gain or to discover yet unknown means; they are not even permitted to err in their judgments. The equilibrium framework may perhaps enable us to obtain a systematic account of the world or of human behavior, but can such an account possibly be valid, or even just adequate?

Equilibrium, as is argued, "is not a state of the economy, any more than the long-run is a point in time";[37] it is not even an operational notion. Within this framework attention is focused on the applicability of models to given situations; correspondence of findings with the 'facts' of 'reality' are of no moment, for the practical problems of human life, and the means by which human beings may gain experience - their mental faculties and their respective activities - are simply assumed away. We are thus assured that in accordance with the 'new' economic approach, decision-making units need not be "necessarily conscious of their efforts to maximize" nor to "verbalize or otherwise describe systematic patterns of their behavior."[38] In other words, robbed of their consciousness in action, and of the use of the higher functions of language - description and argumentation - which are theirs in reality,[39] decision-making units would seem to be rendered into creatures of instinct. Thus replacing human reflective, purposeful action with instinctive behavior, the all pervasive problem of scarcity suggests economic laws to be operating at all levels, and to be decisive in the success of all living. Guided by instinct, the bumblebee, like the human being, is assumed to be constrained by a budget - its own energy budget - and seeking to maximize the nectar which it can obtain by visiting the flowers in its neighbourhood.[40] By means of so simple a process of levelling off, we have succeeded to universalize economic behavior to encompass, not merely human, but all behavior; we may now perhaps also transform economic science into the 'economics of the bumblebee' the 'economics of the rat,' and so on.

Realistically, however, the seemingly 'rational' bumblebee has no ideas and cannot reason nor has it the linguistic facility for description and argument, hence for critical behavior, whereas the human being who may, sometimes or even often, seem 'irrational', is full of ideas, can and does reason and act reflectively and critically. When the 'new' economic approach excludes such human action from its sphere of analysis and concentrates, instead, on the narrow facet of resource allocation, it severs the link between equilibrium states and any possible active human role within it. This may perhaps explain why within the equilibrium framework the question of how the market may possibly equilibrate, if at all,[41] or how equilibrium states may be reached, is ignored; in fact, the exclusion of learning from this framework[42] would seem to remove the very basis for viewing the market as equilibrating. This may perhaps explain why pro-market arguments presented within the equilibrium framework, that is, mechanical markets with built-in tendencies to equilibrium (as on p.9 above) are criticized as grounded, not in science, but in political and ideological considerations.

To be at all meaningful, theories and models, including the artificially created world of equilibrium, must be about 'reality'; if they are to be enlightening and contribute to the growth of our knowledge, such hypothetical theories and models must correspond to 'reality' as closely as possible.[43] The interesting question here is whether we can really expect a high degree of correspondence between the thought construct of general equilibrium and the real world of flux and uncertainty. It would now seem to be generally accepted that convergence to an equilibrium "cannot generally be proved."[44] As argued above, the assumptions and conceptual tools that seem to work so well within the general equilibrium framework, cease to do so when we move on to the reality of disequilibrium; they shed no light whatsoever upon economic phenomena in a world of change and uncertainty[45] while their theories are limited in their ability to predict the course of actual events.[46] It is perhaps not too far-fetched to suggest that we have here a case of the fallacy of 'misplaced concreteness'[47] where a theoretical construction is confused with an empirical conception, or where a "heuristic of fiction" is confused with something real. Considering its frame of reference and the kind of questions it gives rise to, the equilibrium framework (hence the theories which it nurtures, and the approach(es) which it cultivates) is not and cannot be adequate to its task of shedding light on human behavior in the real world of disequilibrium.

SUMMING UP

The above conclusion can be examined on a number of levels. Commencing with resource allocation - the central problem within the equilibrium framework - this, as argued above, is but one narrow facet of the broader, richer and more important problem of human action in the real world of disequilibrium. With resource allocation as the central problem, much that is relevant in the real world of human reflective action is excluded or assumed away. When the constraint of given ends is introduced, as within the equilibrium framework, a variety of interpretive activities that cannot be observed, but are nonetheless, still very much a part of choice behavior, are excluded; the nature of choice behavior is thereby falsfied.

In the other direction, when choice behavior in its true, broader sense, is included in the analysis it helps illuminate market behavior, not as equilibrium, but in the classical Scottish philosophers' sense of spontaneous order, where the important questions concern, not maximizing or optimizing activities, but the nature, formation and cultivation of such order. Here the distinction between market and non-market contexts assumes importance, and it is no longer possible to speak of the 'economics of the bumblebee' in the same sense as we speak of economics as the science of reflective human action. Drawing on the insights of 'Austrian' economists[48] we may note that whereas markets offer priced alternatives which together with the profit and loss system, facilitate rational economic calculation to enable decision makers to find out how well or how poorly their decisions were taken, correct their errors and alter their plans and actions to facilitate improvement in their state of affairs, not so in the case of non-market, non-monetary contexts. Consequently, such non-market areas are not open to economic analysis; to put it even more strongly, there is no non-market economics. We have no universal standards here for gauging the success or failure of decisions, nor of the consequences of actions in a non-market, non-monetary environment where economic calculation is impossible. This may perhaps explain why economic theory turned out to be most fruitful in the context of the market as a process. In the real world of human life and work, the assertion that the 'new' economic approach may serve to enhance our understanding of non-market, non-monetary (human) behavior does not stand up to scrutiny; it remains a mere desideratum.

In a world of disequilibrium, where uncertainty overshadows practically all pervasive decision making, and where interactions of innumerable reflective actions result in

spontaneous orders such as markets, societies, and the like, there is an adjustment of activities, such as the division of labour, for example. Here attempts by economists or others, to determine constant relations would be futile, for there are no such relations in a human world; spontaneous orders are constantly changing and are not amenable to quantifiable relations. The phenomena here are so complex that any particular facts cannot possibly be ascertained; precise predictive economic science is out of the question. In other words, the prediction of the numerical values of unique facts such as prices, quantities or particular ways of acting is not possible. The best that we may hope for under the circumstances are predictions of patterns of behavior.[49] (The problem of complex phenomena is discussed in Section IV below). Here numerical measurement may be of interest only as historical facts, but for the theoretical explanation of the market or of society, as complex phenomena, "the quantitative data are about as significant as it would be for human biology if it concentrated on explaining the different sizes and shapes of such human organs as stomachs and livers of different individuals which happen to appear in the dissecting room very different from, and to resemble only rarely, the standard size or shape in the textbooks."[50]

Thus to study statistics does not mean to study the market or society. 'Statistical' man is not acting man of the real world. The crux of the issue would seem to be epistemological, centring upon how we view man, the world in which he lives and how these affect the extent, nature, and growth of our knowledge. Yet epistemology is considered to have received only scant attention from economists.[51] In contrast, economists like Hayek, who stress the importance of epistemology in scientific endeavor, conclude that without a clear conception of the problems that the state of the theory raises, empirical work is usually a waste of time and resources.[52] It has, indeed, been observed that "after all the display of technical virtuosity" associated with theories within the 'new' economic approach, e.g. the theory of consumer behavior, the knowledge gained is ambiguous, and the economist can hardly utilize any of it to help him understand and explain the complexity of the real world.[53] The application of economic reasoning to available evidence about human behavior in non-market areas that are customarily excluded from economics, as within the equilibrium framework, suggests an appeal to methods that are more likely to deliver the desired results; the criterion of usefulness predominates over the search for 'truth'.

The equilibrium framework has, indeed, been described as a protective framework employing a defensive methodology,[54] and its philosophy of science as "innocuous falsification."[55] If this is true, then it is equally applicable to any approach based upon this framework, including the 'new' economic approach where, despite continuous appeals to the methodological norm of falsification, the reality continues to be one of justificationism manifest in attempts at verification as, for example, when extensive use is made of the calculus of probability as a tool of investigation. Charges similar to those levelled by Popper against the assumed 'scientific' nature of the theories of Marxists and psychoanalysts,[56] have been made concerning some models within the 'new' economic approach; its programs are said to be formulated so as to be compatible with almost any finding, whereas its models are so flexible as to enable the interpretation of "any conceivable event as verification of their theories."[58] When facts do not happen to correspond to the theories, these are not discarded.

To insist, in the name of "positive economics", as within this economic approach, on correlations or on constant relations in economic life, in the same sense as these exist in physical life, so long as these supposedly permit precise predictions of economic phenomena, is to miss the point of the nature of a human world and of economic phenomena. These, as argued above (see also Part IV below), are much too complex to permit precise predictions and again, there are no constant relations in a human world. Often such relations or correlations are really the 'creations' of researchers, only to be overturned by further research. The approach to economic science within this approach (structured within an equilibrium framework, using probability theory and an "empiricist basis) would seem to be "methodologically neurotic", in the sense that it is based on the widely accepted, but "unworkable" positivist characterization of science that is really "false".[58] One consequence of this is manifest in contradictions between the actual practice of "positivism", including continued attempts at verificationism, and continuous appeals to falsificationism as a desideratum.

Whereas Homo oeconomicus may possibly be interchangeable with the bumblebee to permit the economic approach to cross the borders of the market into non-market, non-monetary domains, it is not interchangeable with acting man. As such, Homo oeconomicus, a sterile, artificial construct which diminishes the true stature of acting man, cannot

possibly serve as a basis for an approach by means of which the unification of science may be attained. In an alternative economic approach human action is regarded as the pivot of economic science. In order to grasp the purport of this economic approach, and to sound out its potential as a unifier of science, it is examined next.

IV. THE ECONOMIC APPROACH AS A SCIENCE OF HUMAN ACTION

> "It is impossible to draw a clear-cut boundary around the sphere or domain of human action to be included in economic science."
>
> Frank H. Knight

1. HUMAN ACTION

Homo agens - acting man - perhaps captures best that uniquely human characteristic which sets man apart in the universe. Man's social and political nature would seem to follow from his ability and disposition to reason and act in a reflective manner; reasoning and acting would seem to be two aspects of the same human characteristic without which human affairs cannot be elucidated.

The alternative economic approach to be examined here as a potential unifier of science centres upon human action as the source of economic phenomena, events or experience. This approach is regarded as the most developed among a group of disciplines within the science of human action or praxeology;[59] it embraces an 'evolutionary' epistemology. Here, purpose based on value is pivotal to human action; it distinguishes action - uniquely human - from instincts and impulses - the unconscious behavior which man shares with other living things. This is not to deny that nature, environment, heredity etc., also bear influence upon human action, but only to stress that these are taken as mere datum where the study of human beings commences from purposive conduct; here only man's mental powers - preferences, expectations, thoughts, i.e. theories - are of interest.

On the one hand, the idea of action implies uncertainty, characterizing a world of flux, for if the future were known or even knowable, reaction to circumstances would suffice; there would be no need for human beings to express their will through action. In a world of uncertainty, however, every action is speculation grounded in the actor's ideas - theories - about uncertain future circumstances. On the other hand, the idea of action necessarily implies an orderly world, in the sense of facilitating learning from experience, to enable actors to form expectations about the unknown; without such order purposive action would be impossible. The fundamental purpose of action is to seek improvement by

altering extant circumstances. More, in as much as actors commence with some difficulties and take certain decisions to overcome them, human action may be viewed as an attempt to solve problems. The course of human action would thus seem to depend upon motives and goals, recognition of available opportunities/possibilities for improvement, and an understanding of the role of reflective action in facilitating their attainment.

On a broader level, the idea of action implies a relationship between ends and means. The selection of means appropriate for the attainment of specifically chosen ends forms an important part of the problem of action, and draws attention to the need for explanation, not just of human action, but perhaps even more importantly, of its consequences, especially those that are hidden, undesigned and unwanted. In contrast, choice of ends is personal; actors are free to choose their ends as they see fit, and are constrained only by nature, the universal condition of scarcity, tradition and the like. They may, at any time, discard any of their ends and substitute others in their place, in accordance with their own knowledge/information and valuations. The selection of ends is thus beyond the scope of science; it is not open to judgment regarding its rationality. Ends are, therefore, treated as data to facilitate the analysis of human action, whereas means are always open to assessment in relation to the ends sought.

Thus unlike the ends which they serve, purpose and value imply rationality. Indeed, the suggestion that purpose entails the need to select the means that appear best adapted to attain the actor's ends highlights the crucial role assumed by man's mental faculties both, prior to the action when choosing a purpose, and at its conclusion when the outcome of the attempt to match means to ends is assessed; human action is thus a rational endeavor. It implies value, exchange, prices and costs, and with these come the ideas of scale of value, preference, scarcity and affluence, profit and loss. This special view of rationality as a quality pervading every kind of purposeful action, lies at the heart of the idea of human action. But since action is future oriented, that is, intended to facilitate a better future situation, and since the future may only be conjectured, the idea of action implies imagination - of opportunities for improvement, of the consequences of action or of the future towards which it is directed. Imagination thus joins with rationality to form the twin characteristics which, apart from their contribution to make action uniquely human,[60] facilitate explanation of the market and its phenomena - prices, supply or demand - and the

market's self-regulating nature, in the sense that disappointed actors learn from experience and revise their plans.

In an important sense such rational, imaginative, alert human action is entrepreneurial.[61] On the one hand, the ability to imagine an alternative future induces acting men to attempt to alter their constraints; on the other hand, the need to rely upon imagination in order to conjecture the future in an uncertain world, where knowledge is 'irredeemably' limited, extends the scope of error manifest in the unexpected, unwanted consequences of disappointing actions. Indeed, within this economic approach, error, its discovery and criticism, and the ability to cope with it through learning and the revision of plans and actions, form part of the human make up. As such error is to be understood more in the sense of inefficiency or failure, and so must not be confused with irrationality. It is here, with uncertainty, change, error, and learning, in the background, that entrepreneurial action comes into its own. For the idea of a self-correcting market process would seem to rest upon entrepreneurial action in the sense that participants continuously revise their plans in response to disappointments suffered regarding plans in earlier transactions.

Alert to opportunities for gain, and spurred on to action by the lure of profits, the entrepreneur sets out to act upon such opportunities whenever and wherever these are noted. In the process of his actions the gap narrows between his own strictly 'local' knowledge of his circumstances, and the knowledge obtained from prices generated through the interaction of the 'local' knowledge possessed by a multitude of actors. In other words, prices change through action and, in turn, by instructing actors what to look for and how not to act, such prices cause action to change. It is the entrepreneur who is considered both, to set prices in markets which are always in disequilibrium, thus shedding light upon the problem of price changes, and to contribute to better knowledge/information in the market and, thereby, to the diminution of ignorance. It is in the sense that the market process facilitates learning information that a tendency towards equilibrium may be suggested as an empirical proposition; entrepreneurial action is, in this sense, equilibrating.

The entrepreneurial role of human action would seem to be central to the market process; it holds the key to the understanding of important economic phenomena in disequilibrium situations, notably, price formation and change, coordination of diverse plans and actions, and most importantly, the very process of the market. Equilibrium may be viewed

here in the Hayekian sense, as a state where market participants learn of other people's plans and actions, whereas disequilibrium results because of ignorance of such plans and actions.[62] Here ignorance is explained in the context of a lack of available knowledge/ information, or of failure to note available opportunities for improvement.[63] It is manifest in the appearance of shortages, surpluses, or a multiplicity of prices that signal the existence of opportunities for profit. The market emerges here through competitive interaction, not as a mechanism for deliberate search, but as a 'discovery procedure' of unknown but necessary facts, mobilizing and exploiting old and new dispersed knowledge. It is a 'discovery procedure' because it enables individual actors to use their own knowledge and talents for their own use to facilitate the best utilization of knowledge which is of a "capacity to find out particular circumstances which, become effective only if possessors of this knowledge are informed by the market which kinds of things or services are wanted, and how urgently they are wanted."[64] Its results, however, are unpredictable and may differ from those which individuals aim at; generally, though, such results may be viewed as beneficial, even though they necessarily include the disappointments of some particular intentions.

With human action as the fundamental premise of economic science, economic theory assumes a nature of its own, and the science of economics acquires a unique approach. In one sense, the raison d'être of a science of human action would seem to rest upon the unique individuality of each actor, an individuality which results in a proliferaiton of contradictory, incompatible purposes, plans and consequent actions. It is here that economic theory and appropriate institutions play an important role in overcoming such incompatibility. It is in the real world of scarcity, ignorance and human fallibility that purposeful action is problem solving; it involves judgment and criticism, a process leading to the elimination of those unsuccessful trials which result in error and creates and environment conducive for the better satisfaction of disparate individual aims. Though constrained by ignorance, such action may discover and utilize opportunities for gain, and in the process of doing so, remove much of that constraint.

In another sense, when individuals and purposive organizations, such as firms, act within constraints of open-ended rules of conduct, spontaneous, self-generating, over-all order emerges to achieve coordination among their diverse actions. Here, we could argue with Hayek, that it is not the purposive, but the rule-governed aspect of individual action

which integrates them into an order, the essential feature of which is a feedback device communicating signals to participants to guide them in their actions. Such order facilitates continuous improvement in human well-being through a process of selection out of a pool of experience, knowledge and talents gained through experiment, invention and innovation, that is larger than under any other known method. This suggests that human action is a main source of individual knowledge, and competition in such action is the most effective 'discovery procedure' for the best ways in which to pursue human aims. Once again there is need for economic theory to explain how the practical problem of human action results in this special kind of spontaneous order, the catallaxy,[65], which discovers human purposes and facilitates their satisfaction; also to explain the problems of how such spontaneous order forms, how knowledge is acquired through the market process, what causes a tendency to equilibrium, and so on, the kind of questions ignored by the 'new' economic approach (Section III above). It furnishes economic science with its particular subject matter for study; economics becomes catallactics, a science which deals with the market order, an order resulting from individual human actions, but without being designed by any one individual or group - a problem requiring a theoretical explanation.

Economics emerges here as a science with a unique approach grounded in human action. It would seem to ential the following four suppositions: Firstly, that economics is a science of every kind of rational action, in the sense of human action motivated by a purpose to attain a specific goal, and setting out to investigate the consequences and implications of such action, especially those that are hidden and unwanted. Methodological individualism and the subjective aspects of the human mind, as discussed above, form its special characteristics. Secondly, the patterns and configurations emerging out of the interactions of individuals - spontaneous orders, - grow in importance and interest. Thirdly, the question of an evolutionary approach which is closely associated with the idea of spontaneous order. Fourthly, when human action is viewed as problem solving, it suggests that any activity involving the solving of problems is a rational activity in the above sense of human action. This focuses on the question of the method of science, a rational human activity. Each of these suppositions is examined, respectively, below.

2. GENERALISING THE ECONOMIC APPROACH

(i) ECONOMICS - A SCIENCE OF EVERY KIND OF ACTION

As argued above, the rational quality of purposeful, forward looking action supplies economic science with its own unique approach, and renders economic phenomena open to analysis. In an important sense, such action is viewed as the mark distinguishing the human, from the physical, sciences where the scientist explores, not action, but reaction. Even so, when undertaking his research work, be it in the social or physical sciences, the scientist himself acts; all scientific activity is part of human action.[66]

Viewing rationality as a quality shared in common by all conscious purposive activities of man, human action would seem to be a fundamental principle of all rational action. This suggests that the economic approach centring on human action may be applicable to all aspects of social life, including science as a social activity. Therefore, if we wish to distinguish economic from non-economic phenomena, we must look, not to the rationality of action (for all action is rational), but to the fact of action itself, as against reaction. In as much as science is a social, as well as a rational activity, with each scientist being motivated by a specific goal, and choosing appropriate means to attain it, all disciplines may be assumed to be touched by human action, and to be affected by the results of such action. "Working on science is a human activity like building a cathedral,"[67] that is, both kinds of activities entail human action.

If this be so, then is it possible to have a universal science of human action to embrace all patterns and configurations of such actions throughout the world both, real and imaginary? Such a "master science" was indeed perceived; economic science was believed to offer a common starting point and method for any discipline concerned with explanation of purposeful action and its consequences. Such a "master science" was expected to "explain all the conscious activities of men by reducing them to terms of the motives and choices of the individual consciousness."[68]

In any discussion on human action, attention is drawn to the close relationship between action and knowledge. Action, as would seem, is "grounded by knowledge."[69] In the other direction, action, as argued above, forms a fundamental aspect of human knowledge on which the entire process of gaining knowledge and the growth of knowledge are based. If so, then are the categories of action - purpose, ends, means, etc. -

constitutive of the human mind and intertwined with action (as praxis), or are they independent and rational, in the sense that they are preceded by 'reasoning' emerging from a mind that churns out these very ideas and thoughts to render activities rational? The problem with this second, instrumentalist approach,[70] is that although it may offer a theory of human behavior, it is the kind of behavior that has no basis in reality; it, therefore, does not offer a satisfactory explanation of human action as rational conduct.

The relationship between the said categories of action and the 'mind', would seem to depend upon a theory of knowledge to explain the nature of knowledge and the manner of its acquisition. "Knowledge", as has been suggested, "is of two kinds. We know a subject or we know where we can find information about it."[71] All that this tells us, however, is that some things are not given to us; we have to discover, or search for them. Perhaps a more basic distinction is that between abstract knowledge of the system of human action, entailing the act itself and its various categories, as elaborated above, and the knowledge of concrete situations which guides action that actually takes place. In the case of abstract knowledge comprehension is understood to come, not from experience, but from within ourselves; in the case of knowledge of concrete situations, it is understood that only experience can teach us how to act.[72] Human beings are thus assumed to have some specific knowledge connected with an inborn propensity to seek for regularities, and manifest in their tendencies to classify events and phenomena according to qualities which are common, and known to all of them, and which guide them in their actions. Without this kind of knowledge it is difficult to comprehend how human action could possibly be understood and explained.

In what follows I draw on Hayek.[73] The above suggest a distinction between acquired knowledge about the external world and knowledge about the human/social world. In line with the economic approach as the science of human action, the scientist reconstructs the external world by way of theories that describe relationships between some physical objects. As for sensations and perceptions, these are viewed as acts of classification by the central nervous system and are shared by all human beings. All sensory experience is assumed to conform to certain general principles, and knowledge of these principles is taken to constitute knowledge of the external world. Among studies of man and society, only those few concerned with heredity, population, nutrition, contageous diseases and the like,

are included here, not so those concerned with explanations of action and its consequences, as in economics, political science or sociology. Here relationships between people or between people and things are of interest; there are no rational laws of cause and effect here, only opinions or beliefs about the world and what there is in it.

Accordingly the human mind is not a tabula rasa; it is equipped to cope with, and handle, new experience. There are things which all human beings are assumed to view introspectively, "by immediate acquaintance",[74] things which they know entirely from their own subjective experience of the special classifications of their own sense impressions. Examples include the workings of the human mind, ways in which human beings respond to external stimuli, learn to speak, to group, or to classify things, etc. In this world view, general statements can be made about order because things appear alike/different to all people; knowledge is gained by means of a classification system constructed by the mind, the properties of the construct are known by a series of relationships, such as, say, the system of law, the market as an order, and the like.

Rational action, that is, motivated, purposeful action, would thus seem to evolve within an extant knowledge of how to behave in a manner appropriate to the circumstances of time and place.[75] As Hayek argues, knowledge pertaining to the solution of particular tasks, such as choosing the most effective means to attain some specific goal, may be viewed as practical knowledge involving skills or habits and concerning some concrete situation(s); this would seem to be the kind of knowledge upon which economic life depends. Since most of the objects of human action are based on 'opinions', practical knowledge is knowledge "of the circumstances of the fleeting moment, not known to others";[76] it is not the same for all people. In a world of change and uncertainty each acting individual can possess only some fragments of knowledge pertaining especially to his own circumstances of time and place; it changes along with changes in circumstances. The limitations on knowledge would thus seem to be of a practical and an absolute kind.

The above would seem to suggest that the actor chooses his ends - the raison d'etre of his actions - in accordance with the particular circumstances in which he finds himself at the time in qeustion. In other words, his knowledge here would seem to be of the kind gained in everyday life, be it at work or play; the conduct of buyers and sellers in the market is an example of conduct according to such practical knowledge, that is, of prices

and their effects; it is gained by experience.[77] It is in this sense that action may be taken as the main source of individual knowledge, implying a strong argument for the freedom of action. This sort of knowledge forms one of the basic facts from which the social sciences commence - to explain the unintended consequences of such action. In the other direction, intuitive knowledge may be understood as knowledge of abstract rules which guide action, but of which actors are not necessarily aware. Knowledge emerges here as part of action, and the mind as a system of abstract rules.[78]

As just argued, an appeal is made, within this economic approach, to the situation in which the actor finds himself. Karl Popper attempts to generalize this economic approach to all human action so that the method of economic theory (marginal utility theory, as he puts it) would become applicable to other theoretical sciences[79] His explanation and discussion of rational/irrational behavior as that which is/is not in accord with the logic of the particular situation, would seem to be compatible with the economic approach as a science of human action (i.e. the praxeology). Popper applies the rational action principle of this economic approach, as well as its interpretation of action as attempts to solve problems. He argues that the situational analysis (also termed situational logic or zero method) is "a tentative or conjectural explanation of some human action which appeals to the situation in which the agent finds himself, a reconstruction of the problem situation in which the agent finds himself. Such models are the testable hypotheses of the social sciences."[80] In other words, whoever the actor may be - scientist, artist or cook - we may conjecture what his problem was and we may then search for independent evidence to test our conjecture. The attraction of this human action rationality principle, or the Popperian logic of the situation, is that it may help us understand the results of action, not just within the context of the actor's problem, but within the wider context of relationships between certain problems and their solution.

It would thus seem that in as much as the various categories of action - purpose, ideas, wants, ends, means, etc. - arise within action (praxis) which is intertwined with knowledge, and are then abstracted from it they are inseparable from knowledge. As actors, human beings would seem to commence with imperfect knowledge of how to act, knowledge which corresponds with the action of trying to satisfy the goal aimed at; human action is thus, in part, an abstract of the actor's knowledge of how to carry out his

particular action. In other words, such knowledge encompasses the tradition of action, and involves skills and know how. It influences both choice of ends and means, as well as the outcome of such choice; the matching of given means with the given hierarchy of ends of the economic approach as a science of economic man is not really meaningful. Human intelligence is taken to be shaped concurrently with human institutions in a process of cultural selection, through learning by a process of trial and error.[81] Yet cultural selection itself is not deliberately guided; it is not a rational process but is rather the creator of reason.

The above does not deny that individuals have pre-thought purposes or ends since, as stressed above, an act is always determined by a particular concrete end, and ceases when this has been attempted, successfully or otherwise. The actual pursuit of ends argued above depends on built-in rules, or 'dispositions' adapted to the environment, guiding individuals by means of the information they offer about the situation, and alerting them to the kinds of action that will lead to specific results or which kinds of action are to be avoided. Ability to act would thus seem to depend as much upon what not to do, as on what to do, and the knowledge entailed in action may improve, grow, and lead the actor into unforeseen situations. In as much as the actor knows first how to act, and only then proceeds to do so, rationality, as argued above, forms part of action, suggesting that even though action implies reflection, rationality is judged not in terms of thought preceding action, but in terms of the acting itself.[82] Here judgment as to what is/is not rational action would seem to be guided by the tradition of the activity pursued, that is, by the know how and the skills associated with it, as well as by the results obtained. As such human action may indeed be interpreted as an attempt to solve problems, and the theory of action may be explained, in the above Popperian sense, as a conjectural reconstruction of the problem to be solved and of its background; it is thus testable.

I attempted to show above how human action covers any and every kind of purposeful action so that the economic approach as a science of human action may possibly offer a common starting point for any discipline touched by such action. The economic approach as a science of human action entails what Popper termed situational analysis. Whereas Popper attempts to generalize the method of economic theory, to make it applicable to other theoretical sciences so that all scientific theory may be viewed in terms of the particular problem situation, it would seem, from the above discussion, that situational analysis could

possibly be extended beyond 'scientific' theory, to any theory pertaining to human action, that is, to theories held by any actor, as scientist or as housewife; the actor's problem situation would be conjectural, and independent evidence could be sought to test it. Taken to their logical conclusion these ideas would seem to culminate in critical rationalism, the Popperian approach to science, to be examined next.

(ii) THE CRITICAL-RATIONAL-SCHEMA OF PROBLEM SOLVING IN SCIENCE - THE METHOD OF ALL HUMAN ACTION?

Karl Popper's arguments for the unity of method for all theoretical science, natural or social, and its extension, with certain limitations, to the field of the historical sciences, has been accepted by Friedrich von Hayek, but rejected by Ludwig von Mises, among other economists within the economic approach as a science of human action. Critical rationalism was first developed formally in the methodology of science. If, as argued above, the activity of science is embraced by human action in its broadest sense, then critical rationalism, as the method of science, seems to be also the method of human action. The question of whether the two approaches to rationality - the praxeological and the Popperian - are/are not compatible, is examined below.

Sir Karl's argument for the unity of the method of science[83] centres on the view that all theoretical science, physics or sociology, are branches of knowledge the aim of which is to be both, theoretical and empirical. This means that such sciences have to explain and predict events with the help of theories or universal laws which they try to discuss, and that such theories require the backing of experience. This suggests that the methods of testing hypotheses are always of a particular kind; we deduce some initial conditions, some properties which are then confronted with the results of experience or other observation. Agreement is seen as corroboration rather than as final proof of hypothesis; disagreement means refutation. He rejects the view that it is impossible to submit theoretical systems to empirical tests, arguing that these are refutable, i.e. testable, at least in principle; they are empirical rather than a priori, and informative rather than instrumental.

It is perhaps important to note that at no time does Popper ignore or gloss over the differences between the sciences. On the contrary, he even stresses differences between the various natural sciences as well as between the various social sciences where he cites, as an example, differences between the analysis of competitive markets and the Romance

languages. Registering his agreement with Hayek's explanation of the method of social science, Popper accepts that we have a more direct knowledge of the "inside of the human atom" than we do of the physical atom, knowledge which is intuitive, in the sense that we use our knowledge about ourselves to frame hypotheses about some or all other people. But he continues to hold fast to the view that all hypotheses must be submitted to some method of selection by elimination, that is, tested. Arguing that the physicist also uses imagination and intuition to frame his hypotheses about atoms - the inside as well as the outside - Popper sees this as a private affair, whereas testing renders our hypotheses, not only more interesting, but also more fruitful, so that they can no longer remain a private affair. Like Hayek, Popper singles out the human factor as the ultimately uncertain, uncontrollable element in social life and in all social institutions, explaining the limitations of prediction in the social sciences. He endorses Hayek's argument that "...our knowledge of the principle by which the phenomena are produced, will rarely enable us to predict the precise results of any concrete situation... it will merely enable us to preclude certain results but not enable us to narrow the range of possibilities sufficiently so that only one remains ..."[84] Only this, for Popper, is not a peculiarity of the social sciences, but a characteristic of natural laws as well, since these too "can never do more than exclude certain possibilities."[85]

Popper agrees that whereas in physics, the parameters of equations can in principle be reduced to a small number of natural constants, in the social sciences they cannot; the absence of constants reduces the significance of interpretability and the testability of measurement in the social sciences. Yet he regards the differences in their abilities to experiment as a matter of degree, not kind. It is only where human action enters the picture that Popper concedes that this seems to him to indicate "perhaps the most important difference in their [physical and social sciences] methods".[86] Here he notes the possibility of adopting the method of logical or rational reconstruction similar to what Carl Menger and Friedrich Hayek have termed the 'compositive method' for the social sciences; a logical, not psychological, method using a model behavior as a kind of "zero coordinate" to eliminate the deviations of the actual behavior of people from such model behavior. At the same time he continues to remain steadfast in his argument that the method of trial and error, that is, of inventing hypotheses and submitting them to practical tests, are fundamentally the same in the two types of science; he remains steadfast in his arguments for the unity of science as a unity of method.

Accordingly, all science commences and ends with problems arising from disappointment, difficulties or contradictions. Such problems challenge us to experiment, to observe, to learn, and to advance our knowledge. To understand such problems Popper turns to 'objective' thought, especially of the products of the human mind, where the theory of reason, that is, rational argument to criticize theories, and the theory of experience, that is, testing to help discover mistakes, play central roles. We solve our problems by critically reconstructing the problem situation, by tentatively proposing various competing theories and hypotheses, and by submitting them to critical discussion and to empirical tests. All theories are tried out to see whether they are true; all experimental corroboration is the result of tests undertaken in a critical spirit to find out where our theories err. We learn from our errors through criticism, so that science may progress and our knowledge may grow.[87]

In this Popperian view of science, the core of rationality is identified with critical discussion regarded by Popper as our "intellectual responsibility." He sees theory as "a tool which we test by applying it, and which we judge as to its fitness by the result of its applications", but not as "nothing but a tool."[88] Our method of learning is that of trial and error, a rational procedure. Although all animals try to solve problems and do so by a process of elimination, only human beings can examine theories critically, and do so by sincere attempts to show that their theories are in error, and by accepting the tentativity of their efforts. His is a Socratic view of the rationality of science, centring upon human fallibility, and including the limitations of human reason; we must not expect too much from critical reflection. The characteristics combining to make science rational include the way in which we choose between theories in a certain problem situation, and the accompanying growth of knowledge. The rationality of theory lies in the fact that we choose it because it is better than its predecessors, because it can be put to severe tests and may even have passed them to approximate closer to 'truth', to 'reality'. For Popper it is the idea of truth as correspondenc to reality which makes criticism possible.[89]

It is through the adoption of the critical approach together with the understanding that not only trial but also error, are necessary that the applications of the same method, that is, the hypothetical-deductive method in all sciences is facilitated. It is a method that offers deductive causal explanations and their testing by way of prediction, without the

possibility of achieving absolute certainty for any scientific statement.[90] The emphasis is on the acceptance of responsibility for error in all science - physical, biological and human/social alike. Thus in the social sciences, be it in economics or politics, as in the natural sciences, there is need to assume that there can be no economic policy, nor a political move which has no hidden, unwanted consequences. Looking out for mistakes, bringing these out into the open, analyzing, criticizing, and learning from such mistakes, would seem to be as much the task of the economist and the political scientist as it is the task of the physicist or biologist. Popper's epistemology or logic of discovery becomes, from an objective viewpoint, a theory of problem solving by trial and error, critical discussion and critical testing of conjectural theories; it is a theory of the growth of knowledge. Problems, in an objective sense, can be hypothetically reconstructed by hindsight; only when we find a solution can we know clearly what the problem was.

Rejecting the Popperian thesis for the unity of science as a unity of method, the distinguished praxeologist, Ludwig von Mises insists that " W hat the empiricism of the natural sciences shows is a dualism of two spheres about mutual relations of which we know very little ... the orbit of external events about which our senses convey information to us, and ... the orbit of invisible and intangible thoughts and ideas." He explains this second orbit as the field of human action "about which we cannot learn anything without resorting to the category of finality", and concludes that "attempts to disregard dualism ... bring forth merely nonsense and are useless for practical action."[91]

Conceding that the "positivistic principle of verifiability as rectified by Popper is unassailable as an epistemological principle of the natural sciences," Mises goes on to reject the Popperian thesis of testability in the social sciences, especially in economics. He also rejects the hypothetical- deductive approach of contemporary science with its emphasis on falsifiability and empirical content for the human sciences where he favors, instead, axiomatic reasoning. He argues that human action is a priori, commencing from the a priori category of action - the starting point of all self-evident propositions present in the human mind. For Mises reason and action are "congeneric and homogeneous"; reason is thus not arbitrary, and is not liable to error and misrepresentation. For Mises only logical errors are permitted in economics, errors that may be detected by tracing back the theories in question in chains of reasoning, to the category of action; the impossibility of questioning a

priori judgments of the kind which supposedly characterize human action are thus traced back to introspection. He ends up with the conclusion that every theorem of praxeology "partakes of the apodictic certainty provided by logical reasoning that starts from an a priori category."

In contrast, the equally eminent 'Austrian' economist, Friedrich Hayek, would seem to have given up his initial support of dualism in science, and to have accepted the Popperian thesis of critical rationalism as the method for all science.[92] In the Preface to a volume of studies which he dedicates to Karl Popper Hayek notes that as a result of what Sir Karl has taught him about the falsity of induction as the method of science, the "differences between the two groups of disciplines has thereby greatly narrowed." Whatever differences that remain between the sciences relate, not to their being natural or social, but to the degrees of complexity of their subject matter. Like Carl Menger before him (see note 90 above), Hayek argues, along Popperian lines, that "all knowledge is capacity to predict" and notes discernible regularity in the world to facilitate the correct prediction of events emphasizing, at the same time, that in economics only "pattern predictions", "a second best" kind of prediction is possible; nonetheless these can be falsifiable and are thus of empirical significance. Saying that we "cannot be grateful enough" to Popper for his demarcation criterion Hayek goes on to agree with Popper that testing "at every step is recommended" and that it is desirable to make "our theories as falsifiable as possible." Indeed, as is recognized by a leading contemporary 'Austrian' economist,[93] "Hayek took great pain to emphasize his perception of economic science as being, with the exception of equilibrium anslyses, empirical science."

The incompatibility of the Misesian a priori thesis with the Popperian thesis of critical rationalism is obvious and need not detain us for the moment. But the question of whether Hayek's evident acceptance of the Popperian thesis really amounts to an attempt to intermarry two different philosophies of science, the praxeological and the critical[94] would seem to require further consideration. We could perhaps obtain some insights into Hayek's views on the position of the concept of a priori within the economic approach as a science of human action, i.e. praxeology, from his ideas on the human mind as in the following:

> "To recognise the existence of mind always implies that we add something to what we perceive with our senses, that we interpret the phenomena in the light of our mind, or find that they fit into the ready pattern of our thinking. This kind of

> interpretation of human actions may not be always successful, and what is even more embarrassing, we may never be absolutely certain that it is correct in any particular case; all we know is that it works in the overwhelming number of cases."[95]

In other words, all knowledge, all learning consist of change and modification, including the rejection of some form of knowledge which was there previously. 'Apodictic certainty' and 'a priori truths' would seem to have no place within the Hayekian praxeological world view, for our senses are, after all, 'theory impregnated', that is, open to interpretation, reliant upon imagination and conjecture, leaving much room for error. Here, continuous vigilance and tentativeness, that is, critical rationalism in all science, the human/social or the physical and biological sciences, would appear to be essential.

In the Misesian approach the a priori aspect of human action seems to be understood, not just in the sense of being prior to experience, but also as being valid so as to require no testing, no empirical backing.[96] There are, apparently, no real objections here to the first contention, namely, that human action may be understood as being prior to experience. It is well understood that there are some things which human beings are assumed to know introspectively, entirely from their own subjective experience, or that they have some inborn or inherited knowledge which is taken for granted and which manifests itself sometimes, as dispositions and expectations (see pp.26-9 above). Disagreement seems to set in only when the second contention is introduced, namely, that such knowledge or the category of human action be considered also a priori valid. Such disagreement seems to concern the question of where to draw the line with respect to human fallibility. In other words, are we to go along with Mises and argue that the knowledge of our own actions and of the actions of other people "is conditioned by our familiarity with the category of action" to give us insights which cannot be questioned, or do we argue with Hayek and Popper that, unlike reality, all theories are man's creations so that if man is prone to error, all his theories, all his knowledge, may be false?[97]

Whereas Mises regards the mind as having "power...to produce, out of the material provided by sensation, an undistorted representation of reality,"[98] Hayek argues, as above, and Popper, stresses likewise that things are not given to us, but that we rather learn to decode messages which reach us, and that even if we may have a complex decoding apparatus with built-in checks and balances to eliminate mistakes, it does not mean that

error in immediate perception is not possible. Moreover, the quality of human perception or observation is not to be taken for granted; it is rather a problem to be explained by biologists. "And after all, we do fail sometimes; we must never forget our fallibility."[99] Popper stress that even highly intuitionist mathematicians are known to disagree on some difficult points and to resort to critical discussion; mathematics, like natural science, also grows through argument and criticism of theories, guesses, and informal proofs involving language,.[100] If this is true for mathematics, then why can it not be so also for economics? Both Hayek and Popper would agree that in a human world, to speak of givens, of "true data with certainty attached" would seem to be mistaken theory.

If error and learning are among the fundamental aspects of the economic approach as a science of human action, then the idea of an a priori category of action and of knowledge, understood as being, not only prior to experience, but also valid, would seem to be at odds with such an approach. Within an evolutionary epistemology there can be no room for certainties and 'apodictic truth', regarding human action and knowledge. While the Misesian praxeological approach is not compatible with this conclusion, the Hayekian praxeological approach would seem to be so. Viewing mind itself and its categories as evolutionary products he would seem to question the validity of self-evident universal axioms. Perhaps his greatest limitation of reason relates to his view of the nature of the brain as a classifying apparatus, when he argues that it must be of a higher order or complexity than that possessed by the object classified, implying that the human brain can never really explain itself.[101] However, once we remove the connotation of validity from the a priori nature of some aspects of human knowledge and the category of action, and take it to mean just 'prior to experience', not only does such incompatibility between the praxeological and Popperian approaches seem to dissolve, but a remarkable parallel may be noted between them; the method entailed in this economic approach may perhaps even be seen as the mirror image of the 'rational problem solving' method of science. This is perhaps not surprising when we stop to consider the above argument, namely, that the activity of scientific research is part of human action and that the method of science may be viewed as the formalised version of the method of human action.

Thus in scientific, as in any other human action, we commence with a problem and act upon it in a manner appropriate to the situation. Every act presupposes a purpose, and is

chosen because it promises success though it may, of course, be disappointing. As argued above, it is this choice in accordance with a purpose which renders action rational in the praxeological sense. Theoretical knowledge, judgment or assessment are required for relating certain results to certain actions, for discovering error and for its elimination. In other words, if actors are to be able to discriminate between rational actions, eliminate unsuccessful programs or theories in their daily affairs as in science, they must be able to apply rational criticism which, in turn, is facilitated by a standard of truth or a correspondence with objective reality.[102] The methods utilized by acting man as by the scientist are those of trial and error; he may make progress only when applying the critical approach, manifest by a preparedness to recognize error, admit it and learn from it. The experience of error becomes the basis of the results of our trials at every level, in our daily affairs, as in science. The critical core manifest by the fact that we learn from error, would thus seem to reside not only in the empirical sciences, but in all forms of human action. For example, the equilibrating actions of entrepreneurs in a market situation entail a process of new learning, error discovery and correction/elimination, with error itself engendering possibilities for gain; when taken advantage of, this may dispel extant ignorance through the creation of new knowledge (though, of course, new ignorance may emerge). This suggests the possibility of the growth of knowledge in a market situation just as much as it is in scientific research. Indeed, any theory of rationality, in the sense of criticism, "must be about rational action ..."[103]

Popper seems to assume such a parallelism between the two approaches when he notes that "... the growth of scientific knowledge may be said to be the growth of ordinary human knowledge writ large."[104] He argues that life itself "proceeds, like scientific discovery, from old problems to the discovery of new and undreamt-of problems." He acknowledges human action as the starting point for his ideas and notes that his remarks and discussion on the growth of knowledge in science are applicable, without much change, to the growth of ordinary human knowledge (or of pre-scientific knowledge); scientific knowledge, however, is the more fruitful, in terms of elucidation and explanation. Even the examples which he gives are from the realm of economics, to show that a problem of pure knowledge, that is, of explanation, may originate in a practical problem.

Briefly to summarize the arguments: The Popperian method of science seems to derive from the nature of human action. The unity of science through the method of critical rationalism would thus seem to be the unity of science through human action. The economic approach, as argued above, is concerned with any and every kind of rational action, and economic science is concerned with the results of such action. If critical rationalism is applicable to science, and if scientific activity is part of human action, then the rational way of problem solving would indeed make the critical formulation of our theories applicable everywhere, be it in politics, science, or concerning economic programs and policies. Rationality both, in terms of purpose, and criticism, emerges as the hallmark of action, whereas action emerges as the cornerstone of both, economics as a science of human action, and science in general as a particular kind of human action.

Spontaneous order and evolution, the remaining generalizing aspects of this alternative economic approach, are examined next.

(iii) SPONTANEOUS ORDER AND EVOLUTIONARY EPISTEMOLOGY

The theme of evolution and spontaneous order initially centred on the economic problem of knowledge in the sense that every acting individual starts with incomplete and dispersed knowledge. It was understood to offer a unifying source facilitating the understanding of how some of the major ingredients of civilization, including language and law, institutions, morals and customs, markets and money, or even technological knowledge, have evolved through spontaneous growth in a long process of evolution; a process of trial and error, permitting only the 'fittest' to survive in a competitive contest.[105] Purposeless, overall order, as the unintended consequence of the interrelationship of the reflective actions of innumerable individuals thus first lent itself to theoretical analysis in the politico-economic context. The individuals (as discussed above), are understood to be integrated into such an order simply by following their own purposes and knowledge of their own circumstances, and by obeying abstract, undesigned and little understood rules of conduct; the order's feedback system is understood to communicate guidelines to help these individual actors to cope better with their problem of ignorance and to facilitate the coordination of their disparate actions. Human action is central to this theme of spontaneous order, and the economic approach as a science of human action embraces an epistemology that links its various propositions together into systematic unity.

Intertwined with such rules of conduct is reason which, like spontaneous order, is a product of inter-individual activities. As a product of the human mind it is limited and its limitations focus on the fragility of spontaneous orders of the social kind - markets and other social institutions. With reason as only one among other factors guiding human action, there can be no interference with such orders without the disruption of their orderliness. In other words, whereas 'tinkering' with parts of the order may at times, perhaps, be possible, not so with the structure itself.[106] Yet the idea of an order suggests the counter-balancing of the limitations of the activities of the human mind, in the sense that, not only does such order enable individual actors to make a more effective use of their knowledge, but some of their actions may even be equilibrating - a self-restoring process resulting from actions guided by abstract rules of conduct.

Within this Hayekian framework, such rules that govern individual behavior in society are viewed as both, innate, that is, transmitted genetically, and learnt or imitated, that is, the result of cultural evolution. Like spontaneous orders, culture is regarded as neither rationally designed, nor genetically transmitted, but as "a tradition of learnt rules of conduct which have never been 'invented' and whose functions the acting individuals do not understand."[107] Since the order of society is based on a tradition of abstract general rules, it follows that all social 'progress', in the sense of improved well-being, could be based upon tradition. In this context culture develops concurrently with reason and cultural selection is not a rational process. Even though 'mind' is taken here to be 'embedded' in culture (as a 'tradition of learnt rules') the relationship between them may perhaps still be considered, in a sense, as symbiotic.

Accordingly, all spontaneous, enduring structures, rules or even traditions, are the results of, and can be explained, only in terms of, principles of evolution and selection based on 'success'. It involves a long range course of change, from an ends-dependent face-to-face society, to an ends-independent open society. Evaluation is in terms of 'progress' (in the sense of improved well-being). 'Success' is thus a sign of relative superiority; the idea of the survival of the 'fittest' suggests that those who emulate the 'fittest' by adopting similar rules of conduct, traditions, and the like, have prospered and expanded "perhaps less by rapid procreation than by the attraction of outsiders."[108] This qualification is, no doubt, pertinent, especially nowadays, when imitating a particularly successful model of conduct

could be beneficial, whereas often, a mere increase in population results in deleterious effects. Examples here include the exchange society guided by conditions of a wide ranging division of labor and the price system, where the interactions of individuals following the rules of the market system create an environment which, through a process of natural selection, rewards with profits those patterns of behavior which appear successful, and penalizes with losses those who follow patterns of behavior which incur higher costs. Successful endeavors are imitated in the market system, whereas unsuccessful ones are eliminated in this process of competitive survival. The process of selection occurs through a system of norms, morals and rules that help life in society attain the best 'fit' to its environment. Markets, like culture, are successful because they evolve in a manner that enables individual participants to economize in the knowledge required for their respective effective decision-making.

The market, however, is only one among a wide range of social institutions which grow in such a spontaneous orderly manner; the whole of civilization (as noted above) and all human values, including moral beliefs and justice, would seem to be altering and changing in a long process of evolution. Even rationalism is regarded as evolutionary, the mind resorting to abstraction to deal with a reality which it cannot fully comprehend. The same sorts of arguments may be found in explanations of the evolution of biological organisms as for social institutions, and spontaneous orders are not limited to social or biological processes. They may also be found in the realm of nature, ranging from crystals and complex organic compounds, to gallaxies and solar systems.[109] Indeed, the insights gained from such economic analysis served as tools and, (as noted above) were applied in a wider social context, and also in biology. Yet the economic theory of the market order is so far the only theory which has been developed over the last two hundred years.

Insofar as order is understood to suggest that some things mean the same to all participants so that they tend to behave in the same way, a theoretical explanation is called for. The problem with spontaneous orders is that all parts involved are interdependent; the phenomena are so complex and dependent on so very many circumstances, that very little can be known about properties of the individual elements. This limits drastically the possibilities of prediction and control; only the pattern or the abstract order may be explained and possibly predicted, but not predictions about the specific phenomena. The sort of knowledge

obtained here has been described as 'knowledge of the principle' by which all complex phenomena are produced; in as much as this alerts us to the kind of events to expect or not to expect, it is testable knowledge. Its merit is that it may help us to act more effectively.

The idea of spontaneous order seems to have shifted the emphasis away from subject area to that of the level of the complexity of the different disciplines as the source responsible for the level of reliability concerning respective abilities to predict and control - the assumed characteristics of science. The dichotomy is no longer that between the natural and social sciences, but rather that between complex and simple phenomena. The question to bear in mind here is whether this shift in emphasis adds any strength to the conclusions reached earlier (above) pertaining to the unity of science through the economic approach as a science of human action where evolution and spontaneous order play an important role.

The above ideas on the formation of social order through the selection of rival traditions, habits, rules of conduct and so on, are what cultural evolution is about. Fundamentally, it is a knowledge process, with adaptation, imitation and learning, in trial and error fashion, as part of the process. But then all evolution, including that in the biological fields, would seem to be a knowledge process in which the surviving organism incorporates information about its environment through a process of adaptation, and passes it on, implying an increase in knowledge. But if knowledge is to grow, then it must, as argued in the Popperian outlook, be open to critical scrutiny. Here Karl Popper is presented as "the modern founder and advocate of a natural selection epistemology which came to be known as 'evolutionary epistemology'".[110] Its aim is to investigate and clarify the process by which knowledge grows, to enhance our understanding of both, evolution and epistemology, insofar as they coincide with scientific method. Having discussed already the Popperian ideas on critical rationalism as a method of science, and its relation to human action in the method of economics, I briefly examine the theory of 'evolutionary epistemology', next.[111]

Sir Karl's theory of evolution is a general theory emphasizing that the physical world is an open system comparable with the view of the evolution of life as a process of trial and error elimination; it permits rational understaning of the emergence of "biological novelty and the growth of human knowledge and of freedom". The growth of knowledge and scientific discovery through which such growth can be studied best, occupy centre stage here. When evolution in general is viewed as a knowledge process, the growth of such

knowledge can be generalized to other epistemological activities to include learning, imitation and science (as is argued below). The Popperian theory would thus seem both, alert to, and compatible with, the evolution of man as a product of biology and of, the (above discussed) process of cultural evolution.

Human action, or rather the evolution of human behavior, appears at the heart of this theory, with the evolution of language functions from lower animal language to higher human descriptive and argumentative language functions, helping man (as argued already within the cultural evolution framework) to transcend his lower animal level. This is identified with the evolution of new means for problem solving, by new kinds of trials and by new methods of error elimination; it is assumed to hold for anything which may be submitted to critical discussion, be it theories, proposals and so on. In other words, 'evolutionary epistemology' would seem to be an application of the Popperian methodology of critical rationalism to areas beyond the purely scientific research, in line with the above argument that it applies equally to human action in general.

In this Popperian scheme of things, the argumentative function of language makes criticism possible, and with it the practice of science, for critical argument is a means to eliminate error; it is a means of selection. Tentative, competing theories are submitted to critical discussion as solutions to problems. This provides a feedback system of 'plastic' or 'soft' control; on the one hand our actions are controlled by our theories and purposes and, on the other hand, we are free to reject our theories whenever we think that they fail to meet our standards.

The evolutionary process itself is viewed as a growing hierarchical system of 'plastic' controls, a system which the organism incorporates; knowledge here is 'embedded' and, as it grows, there is an increasing adaptation ('fit') between the organism and the environment. On the human level, the control system is evolved 'exosomatically' or 'extra-personally'. As knowledge grows here, the increasing adaptation ('fit') is between theories and fact. Popper seems to assume here a Neo-Darwinist theory of evolution as an account of the growth of genetic knowledge, but in a restated form, where multiplicity of tentative solutions are offered - the 'blind' variations through gene mutations or random combinations of genes. There is only the one problem of survival by natural selection, duplication, or invariant reproduction, and the elimination of the organism is the one method of error elimination;

the differences between old and new problems are overlooked. In contrast, Popper's theory of evolution offers a rational account of 'creative' or 'emergent' evolution, in the sense that problems or problem situations are often new and are products of evolution, highlighting the distinction between old and new problems. Though knowledge is processed here, human knowledge is presented as developing, nonetheless, in the same way as in biology. In other words, like animal adaptation, imaginative, creative knowledge is seen as a product of 'blind variation and selective retention'.[112] Here the error elimination controls permit the elimination of error by relinquishing the hypotheses without having to destroy the organism. Accordingly, each organism is engaged all the time in problem solving by trial and error; passive induction as a means for gaining knowledge is rejected in favor of an active, exploring, trial and error process, suggesting that like mutations in biology, conjectures or theories cannot be justified.

The upshot of Popperian evolutionary theory is to view the growth of knowledge as achievable through 'random variation and selective retention', that is, through 'conjectures and refutations'. Selection occurs through confrontation with observation; learning takes place through selection. Popper concludes that there is some feed-back here and, therefore, some interaction, between mental activity and other functions of organisms. To explain how this is so he introduces World 3, containing the products of 'objective' mind, notably, problems, problem situations and, most importantly, critical arguments, also the logical contents of journals, books, computers and so on. These interact with World 2 where conscious experience resides, that is, knowledge which depends upon linguistically formulated theories so that there is also interaction with the state of the physical environment, or World 1. In other words, theories within World 3 represent World 1; instead of relying directly on our senses to understand the physical world, we resort to theories to study it indirectly, that is vicariously.[113] Full consciousness of self is assumed to depend on theories and these are the result of language. Popper argues that World 3 exercises a 'plastic' control over much of human action and over the human brain, that is, World 2, since we gain the knowledge that belongs to it through our senses and the brain. It is human knowledge - science - formulated in descriptive and argumentative language which makes World 3 specifically human. It is a pluralist approach with wide-spread interaction, between the controlling and the controlled; it extends interaction to tentative solutions with problems and also with aims, suggesting

that aims can change, different aims may compete, new aims may be transmitted and controlled by the method of trial and error-elimination, and that the choice of aims may, in turn, become a problem. Since human action is motivated by aims and is directed to problem solving, we may perhaps conclude, in line with our earlier findings (Section IV, ii) that human action is open to control by the method of trial and error-elimination.

Popper's 'evolutionary epistemology' is thus a model of rational problem solving. As a natural selection theory it is structured within his scientific method of critical rationalism, but it may be applied to areas beyond pure scientific research. The 'variation and selective retention' process of evolutionary adaptation within this theory, a theory of the growth of knowledge, would seem to be fundamental to all increases in knowledge, hence to all improvements in adaptation ('fit') of the system to the environment, be it on the level of the simplest organism or at the most imaginative and creative of the human level.

The generalization of the 'variation and selective retention' of the process of evolutionary adaptation in this Popperian theory has been recommended by Donald Campbell to cover "a nested hierarchy of vicarious knowledge process"[114] since all knowledge expansion or discovery is viewed as a trial and error process. His scheme incorporates all forms of knowledge, including the products of thought, under a "blind-variation-and-selective-retention" model, arguing that insofar as trials are ventures into the unknown, they are 'blind' rather than 'random'.[115] Since animal evolution proceeds mainly by the modification of old, or the emergence of new, organs or behavior, Campbell argues that all organs, structures and activities which have been added to the various organisms through the evolutionary process, play a vicarious and indirect role and can themselves be explained in terms of natural selection. Among the 'discrete' levels selected for his scheme are included the knowledge process of vision, thought (or rather visually supported thought), observational imitation and learning, language, cultural cumulation, and science as an aspect of the socio-cultural evolution. All of these are viewed as vicarious and expendable in terms of their natural survival value. In other words, just as theories, in the world of science, act vicariously, that is, as a sort of go-between the senses and the external world, similarly these forms of knowledge processes, organs, etc. act vicariously and indirectly. Their effect is to increase the organism's survival potential by diminishing the need for it to come in direct contact with a potentially hostile environment.

If all knowledge may, indeed, be incorporated under a 'blind-variation-and-selective-retention' model, then perhaps, as Gerard Radnitzky reflects[116] "it grounds "evolutionary" epistemology and with the help of this new discipline we then can stylize the biological and cultural evolution (von Hayek) and then eventually come back to the level of science." I would add that we may perhaps take this even further back to the level of human action with which science begins. If I interpret this correctly, then since all evolution is a knowledge process, 'evolutionary epistemology' as a theory of the growth of knowledge would seem to be fundamental to all other theories of evolution, biological, cultural or other, in the sense that all evolutionary processes function in the same manner as does evolutionary epistemology. All evolutionary processes would thus conform to the method of critical rationalism, the context within which evolutionary epistemology is structured. In the selective retention scheme, it is at the level of science that we return to Popper's "homeground" where realism, that is, the 'fit' of the system to 'reality' is important, where 'truth' as a correspondence with the 'facts' is the criterion, and where concern lies with the highest level of knowledge. It is the combination of creativity directed towards objective truth, and the use of rational criticism to select among competing theories which is assumed to enable man to act rationally, make judgments, and discriminate among competing theories. This, however, applies not only in the world of science, but to life in society, to the world of biology - to life in general.

Thus in biology we have examples of a knowledge process of natural selection; in social evolution we have improved well-being in the context of social order, through the selection of rival traditions, habits and rules of conduct. Human interactions, in accordance with abstract rules of conduct, bring order in society; the evolution of theories or myths, as Popper terms it, helps us bring order into the events of nature. In science, in society, in life, these form part and parcel of ongoing change, but they also give us something which, as acting human beings we can both, criticise and, within limitations, also change.

V. CONCLUSION: UNIFICATION THROUGH THE ECONOMIC APPROACH - FACT OR FICTION?

As argued above (Part III), without an epistemology to guide it in its choice of method, the 'new' economic approach would seem to embrace some lingering remnants of the faulty methodology of positivism. Consequently, it treats the static deterministic world of equilibrium as if it were the dynamic uncertain world of real life and work. In view of its instru-

mentalist approach to science, it opts for practical purposes and convenience, rather than for truth as a correspondence with 'reality'. In line with its equilibrium framework it treats human beings as natural entities, on par with the bumblebee, the flower it visits, the stone it rests upon and the rest of the natural scenery. To facilitate quantification and objectification, man is stunted and deformed (by excluding from analysis the activities of his mind and his facility for argumentation) so that he may fit into the same statistical slot as the bumblebee. His problem too is cut down to size - resource allocation - to be shared with the bumblebee, and carried out in a mechanistic, instinct driven manner to attain an efficient result. Wittingly or unwittingly, this approach ends up with a caricature of man living in a make-believe world, where market, and non-market, non-monetary contexts alike are assumed to be open to explanation by a discipline employing some assumptions and conceptual tools which have meaning only in equilibrium situations; in real life they turn into fiction. Here the ideas and ideals of freedom, choice, efficiency, and the like, are emptied of their content and rendered meaningless; regimentation and control - in bumblebee fashion - go hand-in-hand with an equilibrium framework. For an answer to the question: how well may this economic approach serve as a unifier of science? we may turn to Einstein who once said about science: "without epistemology - in so far as it is thinkable at all - it is primitive and muddled".[117]

In the other direction, the alternative economic approach (Section IV above), grounded in human action, adopts an evolutionary epistemology and is thus structured (at least in its Hayekian version) within the method of critical rationalism, with truth as a correspondence with the facts as the criterion for choice of theories. Understanding the world of human action, especially the unintended consequences of such action, and investigating the phenomena generated through the interaction of individual purposeful actions are considered to be the primary tasks of economics as a science. Diversity in all aspects associated with the human mind - interpretations, expectations, tastes - within a diverse human world of uncertainty and disequilibrium, is emphasized, as are also human fallibility, manifest in error of judgment, and human ingenuity, manifest in creativity, learning, foresight and adjustment. Quantification, objectification and control of any manner, are viewed with much scepticism.[118]

The unification of science within this economic approach was suggested on three interrelated, complementary levels (insights into each of which were first gleaned within a

politico-economic context): human action as a rational, problem solving activity, spontaneous order (complex phenomena) as the outcome of the interrelationship of such action, and evolution as the process through which such phenomena emerge. Human action appears here as a fundamental principle of all rational action and is deemed to be applicable to all aspects of social life, including science as a social, rational activity. In as much as the scientist acts in accordance with purpose his activity (though not necessarily his subject of study) is subsumed in human action. The results of such action bear influence on every scientific discipline. Concerned with the explanation of purposeful action and its consequences, economic science would seem to offer the starting point and method (concerning human action) for any and every scientific discipline. The method of science (as argued above) is but a formalised version of the method of human action. Critical rationalism is really the method of any rational problem solving activity; it is the method of both, human action and science - an activity within the context of human action. Intersubjectivity comes into play in the market place in everyday life, as in the scientific laboratory. To be able to discriminate between rational actions, eliminate unsuccessful programs or theories actors, in daily life as in science, must be able to apply critical rationalism facilitated by the adoption of the standard of truth as a correspondence with an objective reality. The Popperian method of science would seem to derive from the nature of human action. The unity of science through the method of critical rationalism would seem to be a unity of science through human action.

Human action would thus seem to form the bridge between this economic approach and the activity of science to facilitate a method, albeit a very modest one, for unifying science. It focuses entirely upon the scientist as actor; subject matter, problems, techniques and so on, continue to remain diverse, hence disunited. We may note Popper's argument here that since science is concerned with truth, the distinction between the disciplines is not a matter of subject matter, but of problems, and these may cut across the borders of any subject matter; theories have a tendency to grow into a unified system.[119] To put this somewhat differently, while diversity persists in the kinds of knowledge sought and in the details of the means for attaining it, unification may occur at the methodological level to ensure the quality of such knowledge. Here creativity and criticism combine to form the best known model for rational problem solving at all levels, however, this is linked

with the economic approach only at the human level, the only level where criticism is possible.

On the second level above, namely, that of complex spontaneous orders, here the unification potential is more limited. While transcending the former boundaries, set in terms of subject matter, between the physical and social sciences, bringing together diverse areas such as economics, biology, learning theories in psychology, and physics (as noted above), it restricts such unity to the complexity of the phenomena. In as much as the science of economics has developed a theoretical construction considered to be suitable for dealing with spontaneous abstract orders (e.g. the market order), the economic approach as a science of human action would seem to have a pertinent role here. At the same time, however, it is perhaps important to bear in mind, that since there would seem to be no economic ends, there can be no imposition of such ends on others. All that economic science can do here is to facilitate, via explanation, the reconciliation or the coordination of competing ends. The questions asked continue to remain diverse.

The unity of science here pertains to the common methods available for the understanding of such complex phenomena, how these arise, how they function and how they are maintained in the face of various, change-instituting, tensions. It is here that we reach the third level, unification through the evolutionary process through which such complex phenomena emerge. In the first place it denies the arrogant claims of the rational constructivists, their conceptual tools and methods, and focuses, instead, upon the limitations of human reason and rationality. The evolutionary perspective brings together cosmology, biology, culture and civilization, learning, and the growth of knowledge. As argued (in the last few pages of part IV,iii above) since all evolution is a knowledge process, evolutionary epistemology appears as the foundation of all evolutionary processes, linking together the insights on the biological, cultural and other evolutionary processes, enabling us to bring it all back to critical rationalism, the method of science within which evolutionary epistemology would seem to be structured, and finally, back to human action as the possible starting point of all science.

The value of a science unified through the economic approach as a science of human action would seem to lie primarily in the support which it offers to rational criticism as the method of science, or of any rational action. It highlights the close connection between the

ideals of science - the growth of true and new knowledge - through human creativity of the highest-level, and criticism, and the ideals of personal liberty, ideals which are fundamental to this economic approach where the problem of incomplete knowledge is central, and where personal freedom - of thought and of action - is an essential means for tackling it. If we value science for what it offers us, then we would seem to have to value equally that social order - the open society - within which science at its best can be practised, and that economic approach which makes such order intelligible.

FOOTNOTES

1. Ludwig von Mises, The Ultimate Foundation of Economic Science, (Sheed Andrews and McMeel, Kansas City, 1978, 2nd ed.) p.121.

2. Karl R. Popper, The Logic of Scientific Discovery, (Hutchison, London, 1974, 7th impression); The Poverty of Historicism (Routledge & Kegan Paul, London, 1963 reprint), n.1 p.105; Objective Knowledge, An Evolutionary Approach (At the Clarendon Press, Oxford, 1972), p.186.

3. Donald T. Campbell, "Blind Variations and Selective Retention in Creative Thought as in Other Knowledge Processes," Psychological Review (1960), 67, 6, pp.380-400; "Evolutionary Epistemology", The Philosophy of Karl Popper, ed. P.A. Schilpp (LaSalle: Open Court, 1974) pp.413-63.

4. Attempting to show that the market responds in the same rational way to irrational as to rational households and firms, Gary Becker tried to dispense with the assumption of rationality in economic theory via the assumption that price is an externally determined datum - all market participants are price takers. "Irrational Behavior and Economic Theory", Journal of Political Economy, 70(1962), pp.1-13. Whilst it may be true that equilibrium positions require no reference to rationality, it is a limiting unreal situation. In reality, where actors change plans and actions, human behavior cannot be explained without a cogent theory of rationality.

5. Gary Becker, "A Theory of Social Interactions", Journal of Political Economy (Nov./Dec. 1974) 82, p.1078, quoted in Herbert A. Simon, "Rationality as Process and as Product of Thought", American Economic Association, (May, 1978), p.2.

6. Lionel Robbins, The Nature and Significance of Economic Science, (Macmillan, London, 2nd ed.) p.16.

7. Ibid. p.15 n.

8. Israel M. Kirzner, The Economic Point of View, (The Institute for Humane Studies, Menlo Park, 1976, reprint) p.118. See also p.135.

9. James M. Buchanan, What Should Economists Do? (Liberty Press, 1979) Chapter 2; see also Israel M. Kirzner, Competition and Entrepreneurship, (University of Chicago Press, Chicago, 1973) pp.31-3, 38, 44-6; Perception, Opportunity and Profit, (The University of Chicago Press, Chicago, 1979), pp.27-8, 166-67.

10. Henri Lepage, Tomorrows Capitalism, (Open Court, laSalle and London, 1982), p.5.

11. Gary S. Becker, The Economic Approach to Human Behavior, (Chicago University Press, Chicago & London, 1971 revised ed.), p.8; M.C.Keeley, "A Comment on "An Interpretation of the Economic Theory of Fertility", The Journal of Economic Literature, 13, (1975), n.1, p.461, among others.

12. Jacob Marschak, "Economics of Language", Behavior Science 10 (1965).

13. Michael T. Ghiselin, "The Economy of the Body", American Economic Association, (May, 1978) pp.233-37.

14. Bernd Heinrich, Bumblebee Economics, (Harvard University Press, Cambridge, Mass. & London, 1979), pp.vii & 3.

15. George J. Stigler, and Gary S. Becker, "De Gustibus Non Est Disputandum", American Economic Review, 67 (1977), pp.76-90.

16. Perhaps the most tenacious attempt to remould all theories of behavior into a particular brand of utility theory has been made by Becker, Human Behavior, op. cit. where he argues that in any kind of behavior necessitating choice due to scarce

resources, and entailing cost, the individual will choose that course of action which he believes likely to maximize his advantage. Lepage, op. cit., p.162, contends that Becker's approach provides a "scientific, systematic, and rigorous refutation" of the widespread anti capitalism feeling.

17. Frank H. Knight, "The Nature of Economic Science in Recent Discussion", American Economic Review, (June, 1934), p.228.

18. Jack Hirshleifer, Price Theory and Applications (Prentice Hall, New Jersey, 1978), p.18.

19. See Becker, Human Behavior, op. cit., especially pp.44 & 206; "On the Relevance of the New Economics of the Family" American Economic Review, LXIV (May, 1974), p.319.

20. Ibid. (1974), p.317.

21. Milton Friedman, Essays in Positive Economics, (Chicago University Press, Chicago, 1953).

22. Myra Grossbard, "Towards a Marriage Between Economics and Anthropology. A General Theory of Marriage", American Economic Association, (May 1978), p.33.

23. Ibid., pp.33-7; Ronald Cohen, "Preface" in R. Naroll and R. Cohen eds. A Handbook of Method in Cultural Anthropology (New York, 1973), p.v.; G. Dalton, "Is Economic Anthropology of Interest?" American Economic Review, (May, 1978), p.23, among many others.

24. Becker, Human Behavior, op. cit., p.205, also p.6.

25. Even when uncertainty is assumed here, it is more in the nature of Knightian 'risk' or probabilistic uncertainty, not genuine Knightian uncertainty pertaining to unique, single cases where only something, but not everything, can be known about the outcome of such cases. See Frank H. Knight, Risk, Uncertainty and Profit, (Houghton Mifflin, New York, 1921), pp.225-26, & 233.

26. For a more detailed discussion and critique of the 'neoclassical' competitive equilibrium framework, see Naomi Moldofsky, "Market Theoretical Frameworks - Which One?" The Economic Record, (June 1982), especially, Parts III, V and VI.

27. See, for example, Frank H. Hahn, On the Notion of Equilibrium Economics, an Inaugural Lecture, (Cambridge University Press, 1973) p.33.

28. G.Tintner, "The Theory of choice Under Subjective Risk and Uncertainty", Econometrica IX, (1941) pp.298-304; "The Pure Theory of Productrion Under Technological Risk and Uncertainty? ibid., pp.305-11. While relating to profit maximization, the argument applies equally to utility. These ideas are cited also in Armen A. Alchian, "Uncertainty, Evolution, and Economic Theory", The Journal of Political Economy, LVIII, (Feb.-Dec. 1950), pp.212-13.

29. See especially, mario J. Rizzo, "Uncertainty, Subjectivity, and the Economic Analysis of Law," pp.71-89; Murray N.Rothbard, "Comment: The Myth of Efficiency" pp.90-5; John B. Egger, "Comment: Not a Substitute for Ethics", pp.117-25; all in M.J. Rizzo ed. Time, Uncertainty and Disequilibrium, (Lexington Books, Lexington Mass., Toronto, 1979).

30. See for example, Richard A. Posner, Economic Analysis of Law; Harold Demsetz, "When Does the Rule of Liability Matter?" Journal of Legal Studies, No.1 (January 1972); "Ethics and Efficiency in Property Rights Systems" in Rizzo ed. op. cit., pp.97-116, among many others.

31. James M. Buchanan and G.F. Thirlby, LSE Essays on Cost, (Weidenfeld and Nicholson, London, 1973); J.M. Buchanan, Cost and Choice, (Markham, Chicago, 1969).

32. See George L.S. Shackle, Decision, Order and Time, (Cambridge University Press, Cambridge, 1961), pp.83-5.

33. Karen Vaughn, "Does it Matter that Costs are Subjective?" Southern Economic Journal, 46 (January 1980), p.710.

34. Ludwig von Mises, Human Action. A Treatise on Economics, (Henry Regnery, Chicago, 1966, Third revised ed.), p.395.

35. G.H. Peters, Cost Benefit Analysis and Public Expenditure, Eaton Paper, 2nd ed., I.E.A., (1968), pp. 58-9.

36. This was said on the practice of transposing the unrealistic assumptions of equilibrium to real world situations. Buchanan, What should Economists Do?, op. cit., p.83.

37. Alan Coddington, "The Rationale of General Equilibrium Theory", Economic Inquiry 13, no.6 (December 1975), p.550.

38. Becker, Human Behavior, op. cit., p.7.

39. Karl Bühler, Sprachtheorie: Die Darstellungsfunktion der Sprache (Leipzig, Stutgart, 1934, 2nd ed.); Karl R. Popper, Conjectures and Refutations, (Routhledge and Kegan Paul, London, 1963) pp.134 and 295; Objective Knowledge, op. cit., pp.41, 120, 160, 235.

40. Heinrich, op. cit., pp.3 and 201.

41. see Frank A. Hahn, "Keynesian Economics and General Equilibrium Theory: Reflections on Some Current Debates", in G.C. Harcourt ed. The Microeconomic Foundations of Macroeconomics (Macmillan, London) pp.35-6.

42. See Hahn, On the Notion of Equilibrium Economics, op. cit., pp.20-1.

43. For Discussion, see Moldofsky, op. cit., pp.164-65; Popper, Objective Knowledge, op. cit., pp.38-46, 317,323-24 and n.7, 328-29; Conjectures and Refutations, op. cit., pp.212, 214; The Philosophy of Karl Popper, op. cit., Vol.II, p.1095.

44. Hahn, On the Notion of General Equilibrium Theory, op. cit., p.33.

45. Ibid., pp.25 and 35.

46. Friedriech A. Hayek, "The Pretence of Knowledge" Nobel Memorial Prize Lecture, reprinted in his Full Employment at Any Price, Occasional paper 45, I.E.A., Part II; mark Blaug, The Methodology of Economics (Cambridge University Press, Cambridge, 1980), p.263.

47. The term was made familiar by A.N. Whitehead, as noted in F.A. Hayek, The Counter-Revolution of Science (Glencoe Ill; Free Press, 1952) p.54; also in Fritz Machlup, Methodology of Economics and Other Social Sciences (Academic Press, New York, 1978) pp.339-401.

48. See especially L. von Mises, "Economic Calculation in the Socialist Commonwealth", and F.A. Hayek, "The Present State of the Debate", both in Hayek ed., Collectivist Economic Planning, (Augustus Kelley, Clifton, 1975 reprint) pp. 87-130 and 201-43, respectively.

49. See Hayek "The Pretence of Knowledge", op. cit., especially pp.39-40, among other of his writings.

50. Roger Williams, You Are Extraordinary (New York, 1967) pp.26 and 37, quoted in F.A. Hayek, Law, Legislation and Liberty (Routledge & Kegan Paul, London and Henley, 1979), Vol. III, p.159.

51. See Kenneth Boulding, "The Economics of Knowledge and the Knowledge of Economics", American Economic Review, 56, 2, (1966), p.1.

52. See, for example, Hayek, Law, Legislation and Liberty, op. cit., Vol III, n.3 p.201.

53. See E.J. Mishan, "Theories of Consumers' Behaviour: a Cynical View", Economica (1961), reprinted in D.R. Kamerschen ed., Readings in Microeconomics (World, Cleveland, 1967), pp.82-3; Blaug, op. cit., p.171.

54. See T.C. Koopmans, Three Essays on the State of Economic Science, (McGraw-Hill, New York, 1957), pp.141-42; S.J. Latsis, "A Research Programme in Economics", in his ed. Method and Appraisal in Economics (Cambridge University Press, Cambridge, 1976), p.10.

55. Blaug, op. cit., p.259.

56. Popper, The Philosophy of Karl Popper, op. cit., Vol. I, p.32.

57. M.A. Ferber, and B.G. Birnbaum", The "New Home Economics": Retrospect and Prospects", Journal of Consumer Research 4 (1977) pp.18-28; see Harvey Leibenstein, "An Interpretation of the Economic Theory of Fertility: Promising Path or Blind Alley?" Journal of Economic Literature, 23 (1974) pp.457-9, for the above contention that theories which do not correspond with facts are not discarded.

58. See William W. Bartley III, "Critical Study. The Philosophy of Karl Popper", Philosophia II Nos. 1-2 (February 1983), Part III, p.260.

59. Among economists, L. von Mises has, perhaps, been most consistent in applying this approach in all his writings. For this section of the essay I draw especially on his: Human Actions op. cit., p.33; Epistemological Problems of Economics (New York University Press, N.Y. and London, 1981 reprint), p.33; The Ultimate Foundations of Economic Science, op. cit., pp. 1-46; Hayek, The Counter-Revolution of Science, op. cit., n.20 p.209.

60. Cf. G.L.S. Shackle, Epistemics and Economics (Cambridge University Press, Cambridge, 1972), Preface, p.xii.

61. For some of the insights here and in the following two paragraphs I draw on: Mises, Human Action, op. cit. p.213; Hayek, The Counter-Revolution of Science, op. cit., pp.26-7; "The Use of Knowledge in Society", American Economic Review, XXXV (September, 1945), reprinted in his Individualism and Economic Order (Henry Regnery, Chicago, 1948), p.45; Kirzner, Perception, Opportunity, and Profit, op. cit., pp.143-44.

62. See F.A. Hayek, "Economics and Knowledge , Economica IV (new ser. 1937), reprinted in his Individualism and Economic Order, op. cit., pp.52-5.

63. See I.M. Kirzner, Competition and Entrepreneurship op. cit., Chapters 2 & 3; Perception, Opportunity and Profit, op. cit., p.132.

64. F.A. Hayek, "Competition as a Discovery Procedure, "reprinted in his New Studies in Philosophy, Politics, Economics and the History of Ideas, (Routledge & Kegan Paul, London, 1978), p.182; for other Hayekian insights in this section, see ibid., pp.85 and 149.

65. Catallaxy stems from the Greek katallatein, meaning, in addition to exchange also "to admit into the community" and "to change from enemy into friend". See Hayek, "The Atavism of Social Justice" in his New Studies, ibid., pp.60-1; "The Confusion of Language in Political Economy", ibid., p.90; The Counter-Revolution of Science, op. cit., p.39.

66. See especially Mises, The Ultimate Foundations, op. cit., pp.6-7; for Mises's ideas on a universal science of human action, see his Epistemological Problems, op. cit., p.14, where he gives the example of money which, while impractical in a barter economy, is still true and meaningful.

67. Popper, Objective Knowledge, op. cit., p.182.

68. Sidney Sherwood who first articulated the praxeological approach (1897, noted in Kirzner, The Economic Point of View, op. cit., p.153) argued for such a "master science" of economics.

69. Hayek, The Counter-Revolution of Science, op. cit., p.23.

70. This views the categories of action as independent activities preceded by 'reasoning'. The unique relationship between this approach and the contructivist approach towards economic and social affairs may be gleaned from J.M. Keynes's intellectual predelections - a self-confessed instrumentalist, noted in his Two Memoirs, (London 1949), pp.100-03, and constructivist, noted especially in his The General Theory of Employment, Interest and Money, (Macmillan, London, 1936).

71. Samuel Johnson in J. Boswell, Life of Samuel Johnson, L.F. Powell's revision of G.B. Hill's edition, (Oxford, 1934), Vol. II, p.365, quoted in Hayek, New Studies, op. cit., n.4, p.182.

72. See Mises, Epistemological Problems, op. cit., pp.13-14; Hayek, The Counter-Revolution of Science, op. cit., pp.26-7, 79; Cf. Popper, The Poverty of Historicism, op. cit., pp.47-8.

73. See especially, Hayek, ibid., pp.25, 30-1, 42, n.78, p.217, 23; The Sensory Order: An Inquiry into the Foundations of Theoretical Psychology (University of Chicago Press, new edition, 1963), chapter viii.

74. Robbins, op. cit., p.105.

75. See Mises, Epistemological Problems, p.124. Whereas economists embracing this economic approach would seem to agree that such knowledge forms the only basis for our understanding of other people's intentions, hence actions, and so of all our historical knowledge, there would seem to be disagreement concerning the validity of such knowledge. L. von Mises views such knowledge as a priori and claims for it "apodictic certainty"; F.A. Hayek, having written on one occasion that the "elements of the complex phenomena therefore are known to us beyond the possibility of dispute" (Collectivist Economic Planning, op. cit., p.11) seems to follow Karl Popper here (The Poverty of Historicism, op. cit., pp.47-8) when he argues that we may never be certain that this kind of man's interpretation of interests and actions is absolutely correct (The Counter-Revolution of Science, op. cit., p.76-8.

76. Hayek, ibid., p.98; see also pp.30-1, 60-3; The Sensory Order, op. cit., pp.184-90. The quotation is from his Counter-Revolution of Science, ibid, p.98; see also his "The Theory of Complex Phenomena", in his Studies in Philosophy, Politics and Economics, (Routledge & Kegan Paul, London, 1976), pp.30-1.

77. Cf. K.R. Popper, The Poverty of Historicism, op. cit., p.85.

78. F.A. Hayek, "The Primacy of the abstract" in his New Studies, op. cit., p.41.

79. K.R. Popper, The Poverty of Historicism, op. cit., pp.149f.; Objective Knowledge, op. cit., pp.70, 109, 167, 178-9 & ns, 182-3, 186-90, 197-98; The Open Society and Its Enemies, (Routledge & Kegan Paul, London, 1957, 3rd ed.) vol. II, pp.97, 265.

80. Popper, Objective Knowledge, ibid., p.179; see also pp.197-98

81. See Hayek, "The Atavism of Social Justice", in his New Studies, op. cit., p.68; Law, Legislation and Liberty, op. cit., p.166.

82. Even though Mises argues that "the scale of values ... manifests itself only in the reality of action" (Human Action, op. cit., p.95), he is still said to take a "rationalist utilitarian" approach to knowledge, one which Hayek says he cannot accept. See Hayek, ibid., Vol.III, n.51 p.105.

83. The Popperian views expressed here draw particularly on Popper's Poverty of Historicism, op. cit., pp.35, 130, 132 & n.; p.131, 137-8, p.156; pp.139, 142.

84. Hayek, "Scientism and the Study of Society" parts I and II, Economica, Vols. IX and X, in Popper, ibid., p.139.

85. Popper, ibid.

86. Ibid., p.141 & ns 1 and 2.

87. Ibid., p.87; The Philosophy of Karl Popper, op. cit., Vol.II, p.971; for quotation see ibid., p.117.

88. Popper, The Logic of Scientific Discovery, op. cit., p.108 and n.1 p.59.

89. The sources for this paragraph include: Conjectures and Refutations, op. cit., pp.51, 248; The Poverty of Historicism, op. cit., p.389.

90. Popper notes in his ibid., pp.132-33 that Carl Menger, in his Collected Works Vol.II (1883 and 1933), pp.259-60, also argues that the methods of the sciences are by and large the same; also that in his Problems of Economics and Sociology (1833 and 1963) pp.36-7 and n. Menger singles out the role of error in learning; he stresses the role of prediction in the aim of the theoretical sciences, including economics, explaining that " ... never may science dispense with testing ..." (1963, p.234.)

91. For the two quotations, see Mises the Ultimate Foundation, op. cit., pp.115 and 40 respectively. I draw here on the following: ibid., pp.12, 70, 42, 71; Epistemological Problems, op. cit., p.17; The Ultimate Foundations, op. cit., p.44.

92. Hayek, however, does say that while "our theory leads us to deny any ultimate dualism of the forces governing the realm of the mind and that of the physical world respectively, it forces us at the same time to recognize that for practical purposes we shall always have to adopt a dualistic view", Sonsory Order, op. cit., pp.178-79. For quotations cited in this paragraph of the essay, see in order of appearance: Hayek, Studies, op. cit., p.viii; "Economics and Knowledge" op. cit., p.51n; "The Pretence of Knowledge" reprinted in his New Studies, op. cit., p.33; ibid, p.31; "The Theory of Complex Phenomena", in Studies, op. cit., p.29.

93. I.M. Kirzner, Perception, Opportunity and Profit, op. cit., p.24.

94. See for example, Norman L. Barry, Hayek's Social and Economic Philosophy, (Macmillan, London, 1979), pp.40-1.

95. Hayek, The counter-Revolution of Science, op. cit., p.77.

96. See Mises, The Ultimate Foundations, op. cit., p.18. For the following quotation, see ibid, p.71.

97. The Misesian View of a priori would seem, in a sense, to resemble Kant's a priori. If this be true, then Karl Popper's critique of Kant's a priori may be equally applicable to Mises's view. See Popper, Objective Knowledge, op. cit., especially pp.91-3, 130, 37.

98. Mises, The Ultimate Foundations, op. cit., p.18.

99. Popper, Objective Knowledge, op. cit., pp.63-4.

100. Imre Lakatos, "Proofs and Refutations", British Journal for the Philosophy of Science, 14, (1963-64) pp.229-35; Popper, ibid, pp.136-37.

101. Hayek, The Sensory Order, op. cit., pp.184ff.

102. A. Tarski, Logic, Semantics, Mathematics, (Clarendon Press, Oxford, 1956), pp.152-278, discussed in Popper, Objective Knowledge, op. cit., pp.232-24 and chap.9; Conjectures and Refutations, op. cit., pp.42, 50, 82-3, 108.

103. I. Lakatos, Mathematics, Science and Epistemology, (Cambridge University Press, 1978) p.197n., quoted approvingly in Bartley III, op. cit., p.205.

104. Popper, ibid., p.216; also pointed out in his Logic of Scientific Discovery, op. cit., Preface, p.22. For other quotations and insights in this section of the essay see: Objective Knowledge, op. cit., p.146; also p.263.

105. Hayek, "Dr Bernard Mandeville", reprinted in New Studies, op. cit., p.253.

106. See Hayek, Law, Legislation and Liberty, op. cit., Vol.II, p.25. In the Same source, n.25 p.157, Hayek equates such "tinkering" with Karl Popper's "piecemeal engineering" (The Poverty of Historicism, op. cit.; The Open society, op. cit.) but streses his reluctance to accept this Popperian terminology.

107. See especially his Law, Legislation and Liberty, op. cit., p.155; see also ibid., Vol.II, pp.39-40.

108. Ibid., p.159, Concerning mental 'order" emerging in an evolutionary manner, see his Sensory Order, op. cit., pp. 107 ff.

109. See Hayek, "Notes on the Evolution of Systems of Rules of Conduct," reprinted in Studies, op. cit., p.76. On complex phenomena see Hayek, the Counter-Revolution of Science, op. cit., p.42; "The Pretence of Knowledge" op. cit., part II.

110. Donald Campbell, "Evolutionary Epistemology", op. cit., p.450. For this section of the essay I draw on the following sources: Popper, Objective Knowledge, op. cit., pp.35 and 70; "Of Clouds and Clocks: An Approach to the Problem of Rationality and the Freedom of Man". Arthur Holly Compton Memorial Lecture, Washington University, (1965), reprinted in ibid., pp.241, 255, 230-32, 237, 240-41, 249, 244.

111. Campbell, "Blind Variation and Selective Retention in Creative Thought as in Other Knowledge Processes", op. cit. Discussion in the next few paragraphs of this essay centres on the above source and on Campbell's 'Evolutionary Epistemology', op. cit. For Popperian insights drawn upon see: the Philosophy of Karl Popper, op. cit., pp.1058, 1060; "Of Clouds and Clocks" op. cit., p.253.

112. For insights drawn upon for this section, see Campbell, 'Evolutionary Epistemology', pp.450-51, 421-2, 433-34; "Blind Variation and Selective Retention" op. cit.; cf. W.W. Bartley III, "The Challenge of Evolutionary Epistemology", (ICUS 11, Philadelphia, November 25-28, 1982) especially pp.21-40.

113. See Popper, Objective Knowledge, op. cit., pp.139-40; Conjectures and Refutations, op. cit., chap.10 and p.131; Logic of Scientific Discovery, op. cit., p.42.

114. Campbell, "Evolutionary Epistemology" ibid., pp.419-22.

115. Ibid., p.421. Popper (in the Philosophy of Karl Popper, op. cit., p.1062) approves of Campbell's idea of the 'blindness' of trials in a trial and error method and views it, in the active sense of trials, as an advance over what he regards to be the "mistaken idea of random trials, which in any case stand under the influence of a (changing) exploratory drive and (likewise changing) problem situation".

116. In a helpful communication to the author.

117. Quoted in Hayek, "The Dilemma of Specialization", reprinted in Studies, op. cit., p.131.

118. See Hayek, "The Pretence of Knowledge" op. cit., p.35; Moldofsky, op. cit., pp.162-63, 165-66.

119. Popper, Conjectures and Refutations, op. cit., pp.66-8.